

ROADS and STREETS

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION

A GILLETTE PUBLICATION

Gillette Publishing Co., 22 West Maple St., Chicago 10, Illinois • Accepted as Controlled Circulation Publication at Milwaukee, Wis.



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UNIVERSITY MACHINERY
EUGENE D. POWERS INC.

COURT

February, 1959

THE NEW JACKSON TRAILER COMPACTOR



Push or Pull it...
WITH *ANY PRIME MOVER



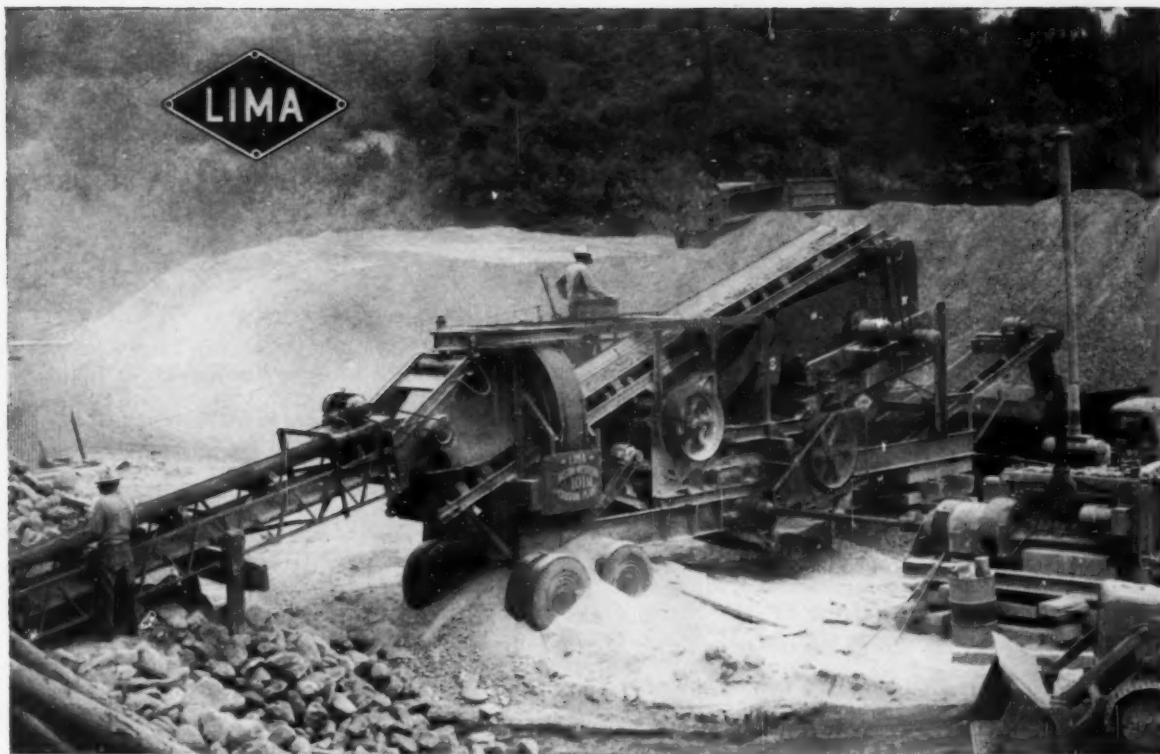
TEAMMATE OF THE FAMOUS **JACKSON MULTIPLE COMPACTOR** which was used exclusively for the compacting of sub-bases on the highly critical A.A.S.H.O. TEST ROAD and most all major highway projects. An excellent means of providing compaction at its quickest and best is offered in the choice of these two machines.

For the host of contractors acquainted with the outstanding performance of the Jackson Multiple Vibratory Compactor, the advent of the new **TRAILER COMPACTOR** will be great news. For here is a machine basically similar, costing considerably less, that can be PUSHED or PULLED BY *ANY PRIME MOVER CAPABLE OF SLOW (50 f.p.m.) WORKING SPEEDS . . . TOWED TO LOCATION AT ANY ROAD SPEED . . . OPERATED IN EITHER DIRECTION, NO TURNING OR BACKING NECESSARY . . . REMOTELY CONTROLLED BY OPERATOR OF PRIME MOVER. WORKHEAD MAY CONSIST OF 3, 4, 5, or 6 VIBRATORY UNITS, (each developing 6,000 lbs. of force at 4200 RPM) OR TWO WORKHEADS OF 4 UNITS EACH MAY BE EMPLOYED. INDIVIDUAL UNITS MAY BE DETACHED AND OPERATED SEPARATELY. POWER PLANT SUPPLIES BOTH SINGLE AND 3-PHASE 110-150 VOLT, 60-80 CYCLE AC AND HAS MANY USES.

Write, wire or phone for additional information.

JACKSON VIBRATORS, INC. LUDINGTON, MICH., U.S.A.

... for more details circle 330 on enclosed return postal card



Lima Austin-Western 101-SE portable crushing and screening plant travels narrow mountain trails to reach such remote end-use site as this, where it produces high tonnage of low cost construction aggregate.

Portable Lima Austin-Western 101-SE crushes, screens 160 tons hourly for Colorado contractor

"There are many reasons why we like our Lima Austin-Western 101-SE portable crushing plant," says Dean McClellan, of Oliver & McClellan Construction, Cortez, Colo. "Features that have paid off especially well for us are portability, push button control and high production at low cost."

Portability a must

"In this part of the country, and in our operation particularly, portability is a must. We move our 101-SE in the mountains over nothing but Jeep trails. Yet we never worry about its upsetting.

"One-man push button electric operation is great, too. The operator sits where he can see the whole plant—he can control any operation all by himself.

"We are more than satisfied with the high production of our 101-SE. Colorado rock has a reputation for being mighty hard to crush. But with our crusher, it

breaks up easily. On a recent job our 101-SE produced 1½ in. minus base material, in 70% crush, at an average rate of 160 tons per hour! In my book, that's good production," Mr. McClellan said.

Diesel, electric power

The 101-SE is a completely portable, rubber mounted, self-contained crushing and screening plant. Diesel engine drives crusher and generator, which powers all other operations. Electric drives eliminate troublesome clutches, chains, sprockets and gearboxes . . . simplify maintenance, help reduce cost per ton. Portable plant capacities range from 25 to over 200 tons per hour.

Keep pace with your cost and progress estimates . . . keep haul cost and time low. There is a high-speed, profit-making Lima Austin-Western plant, portable or stationary, exactly right for your needs. Send for all the facts and the name and address of your nearest distributor.

DISTRIBUTORS IN PRINCIPAL CITIES OF THE WORLD

LIMA AUSTIN-WESTERN Crushing, Screening and Washing Equipment
BALDWIN • LIMA • HAMILTON
 CONSTRUCTION EQUIPMENT DIVISION • LIMA, OHIO



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ROADS AND STREETS

A GILLETTE PUBLICATION

FEBRUARY, 1959

VOLUME 102

NUMBER 2

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More on Contractor Conventions

Much happened at contractor meetings in recent weeks. See notes on the AGC, ARBA and other meetings in March issue.

Asphalt Pavement Quality Control

Watch for exclusive notebook report on the "hot" evening at the Highway Research Board, devoted to Temperature Control of Asphalt and the Temperature-Viscosity relationship in asphaltic concrete quality control.

Nimble Batch Trucks Made a Difference

A detailed report on how one of the Illinois Tollway paving contractors employed a batch truck fleet built to his specifications.

Big Sandstone Cut Blasted, then Scraper Hauled

A dip in rock strata helped this contractor get a million cubic yards of sandstone out of a big cut. So did heavy rippers, and tandem push loading.

BIG JOB COMING UP?



GO WITH GOODYEAR—

for Big Job profit protection

BIG-JOB ANALYSIS:

Goodyear Big Tire Specialists first check every phase of your project.

They carefully analyze each problem of terrain, climate, loads, haul roads, schedules, speeds and other factors.

They recommend, from Goodyear's wide assortment, precisely the tread and tire designs best fitted for your particular job needs.

BIG TIRE EXPERIENCE:

The selections are based on the broadest practical experience available anywhere—for Goodyear has built **MORE** pneumatic vehicular tires than anyone else.

The selections are based on today's top tire-building advancements—for Goodyear pioneering paces the industry; Goodyear **EXCLUSIVES** include the most practical tread and body designs, rubber compounds—and *Triple-Tough 3-T Nylon Cord, GREATEST TIRE SAVER IN 24 YEARS.*

BIG TIRE SERVICE:

Goodyear Big Tire Specialists will help you set up a tire-saving operating and maintenance program to save you **BIG MONEY** in man-hours, machine-hours and useful tire life. If your job requires them, Goodyear contractor service personnel will travel with your job—handle all your tire maintenance and repair needs.

And BIG TIRE PERFORMANCE!

Example: SUPER HARD ROCK LUG

Goodyear has the right worker for *every* wheel. For instance, the new Super Hard Rock Lug (shown at left)—the best-performing wide-base off-roader made—with new "square" shoulder design that packs hefty bonus rubber for stronger bite, longer wear—yet costs no more than conventional wide-base tires!

For all this—see your nearby Goodyear dealer—or write Goodyear, Truck Tire Dept., Akron 16, Ohio.

TRUCK TIRES by

GOOD YEAR

MORE TONS ARE HAULED ON GOODYEAR TRUCK TIRES THAN ON ANY OTHER KIND

Watch "Goodyear Theater" on TV every other Monday evening

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BRAND NEW Barricade Flash!

the *Big Beam*

TRANSISTA FLASH®

- Transistor type, heavy duty for long, dependable life.
- No moving parts to get out of order.
- Two-directional head or 360° dome type Fresnel.
- Electronic flashing mechanism weatherproofed. Telescoping top and rubber gasket make battery case completely weatherproof.
- Acid-proof plastic liners prevent interior case corrosion.

TRANSISTA FLASH produces approximately 2000 hours of continuous flashing from two standard 6-volt batteries, available anywhere. Provided with a concealed, tamper-proof switch operated from outside of case. Equipped with bracket for attaching to barricade. Lens or Fresnel supplied in either amber or red plastic—specify color. Flash frequency is approximately 72 times per minute. Lamp is finished in yellow baked enamel.



No. 433 Barricade—All metal, strong, stable on any surface. Has angle iron construction, closed ends.

Big Beam—makers of explosion-proof lamps, emergency lights, hand lamps and flares.

U-C-LITE MFG. CO.

Export Department: 201 N. Wells St., Chicago 6, Ill. Cable Address: ENOTS
In Canada: Bernard Marks & Co. Ltd., 70 Claremont St., Toronto 3, Ontario

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Model 410T



Model 418T—with dome type Fresnel.



Model 417T—7 inch head.
Otherwise, same as Model 410T.

ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 67 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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NOW! Get your whole "ball of wax" from your Minneapolis-Moline Industrial Dealer!



Here is the 335 Industrial Wheeler with matched backhoe and loader. The 445 and new 5-star Wheelers also have custom-designed backhoe and loader combinations.



1 CUBIC YARD LOADER on 2-Star Crawler with power shuttle challenges you to find its equal at low-cost dirt moving. 2-Star also comes with Moline backhoe, log forks, scarifier. 2-Star gives top performance with fuel-saving power.



2-STAR CRAWLER is power-proved for dozer capacity. Moline power shuttle boosts working range on all jobs. Gives unmatched performance with fuel-saving power, faster change of speeds, directions, advanced engineering improvements.



445 INDUSTRIAL WHEELER with its $\frac{3}{4}$ yard loader is the heavy-duty companion to the 335. Matched backhoes and choice of fuels. Hydraulic power steering. Ampli-Torc transmission doubles effective working power without clutching.



335 INDUSTRIAL WHEELER shown with matched backhoe and loader is the answer to your digging problems in tight quarters. Really easy to maneuver. Large capacity, works side-by-side, hour-for-hour with the BIG BOYS.

★ Backhoe-Loader combination
custom-designed for the new Moline
Industrial Wheelers!

★ Entire unit sold and warranted by
Minneapolis-Moline!

★ National dealer organization assures
1-stop 24-hour parts and service!

From the new Minneapolis-Moline comes the newest advance in construction equipment: field-proven Moline Wheelers and Crawlers and your choice of specifically designed equipment matched to this industrial power. Entire unit is fully warranted by Minneapolis-Moline! *Here are advantages for you:* You can buy the particular piece of equipment you need now for your Moline Wheeler—then you can add other equipment perfectly matched any time your jobs require it! Your maintenance and service are simplified. And parts for the whole "ball of wax" are immediately available from your Moline dealer.

See your Minneapolis-Moline dealer about this newest advance in construction equipment. For name of the dealer nearest you, write today to Roger Hipwell, Sales Manager, Minneapolis-Moline Industrial Division, Hopkins, Minnesota.

"And, if you're a construction equipment dealer who'd like to make some real money, write today for full facts about this fast-growing line!"

Roger Hipwell

**MINNEAPOLIS
MOLINE**

makes the news in modern industrial
and construction equipment.

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White Oak Excavators meet the deadline at Hogback Dam:

Texaco Plan lets White Oak lube

Contractor reports Texaco Simplified



THESE SIX TEXACO LUBRICANTS, shown here with White Oak Excavators' Vice President, John Toffolon, and H. F. Porter, Texaco representative, permit their rig to lubricate all major equipment.

RIVERTON, CONN.—White Oak Excavators, contractors for Connecticut's Hogback reservoir dam, have found that the Texaco Simplified Lubrication Plan makes their truck-mounted lube rig more useful than ever before.

"The Texaco Plan is really essential to getting the best use of our lube rig," says John Toffolon, one of White Oak Excavators owners. "Our Texaco Plan calls for just six lubricants to handle everything on the spread. We can take our whole lubricant inventory right out into the field. That's especially important to us because we use equipment made by practically every manufacturer."

Using no more than six lubricants on this \$4,225,000 project has other advantages, too. For example, smaller inventory (six lubricants instead of 15 or 20) means less



HOGBACK PROJECT involves an earth and rock-fill dam to supply water for the greater Hartford, Conn. area. It is 135 feet high and 800 feet wide, and will create a 6½-billion gallon reservoir on the west branch of Connecticut's Farmington River. The dam is designed to discharge 92,000 cfs. It also has a 3 mile tunnel to the Barkhamstead reservoir, and a diversion tunnel designed to carry flood waters up to 31,500 cfs. White Oak Excavators are moving about 600,000 yards of gravel, earth and sand; 500,000 yards of rock; 95,000 yards of impervious soil core; and 30,000 yards of concrete. This requires a full range of construction equipment, all fully protected by the six lubricants comprising the Texaco Simplified Lubrication Plan.

rig handle all field lubrication

Lubrication Plan "essential to best use of lube rig"

handling, less storage space, less chance for misapplication. And, of course, the Texaco Simplified Lubrication Plan developed for the Hogback project comprises lubricants specifically chosen to meet the requirements of that particular job.

Here are the six lubricants, shown at the left with Mr. Toffolon: (1) For engines: *Texaco Ursa Oil Heavy Duty*; (2) for chassis, wheel bearing and general grease lubrication: *Texaco Marfak Multi-Purpose 2*; (3) for hydraulic units: *Texaco Regal Oil R & O*; (4) for transmissions and differentials: *Texaco Meropa Lubricant*; (5) for wire rope and open gears: *Texaco Crater*; (6) for

track rolls: *Texaco Track Roll Lubricant*.

You'll save time and money by letting a Texaco Lubrication Engineer work out a Simplified Lubrication Plan tailored to the specific requirements of your project. Just call the nearest of the more than 2,000 Texaco Distributing Plants, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

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ROADS AND STREETS, February, 1959



2-yd Loader Averages 2,700 yd Per Day for 5 Months on 2½-Million-yd Borrow Job

JOB: Relocation of Route 5 from Longmeadow, Massachusetts, to state line of Connecticut. 2½ million yards of borrow. Started last summer.

REPORT: — "Everyone in the area, it seems, who owns a shovel and a couple of trucks, is hauling on this job," says an on-the-spot reporter.

"The center of attraction, though, is the 2-yd TL-20 TRACTOLOADER* owned by Enfield Road Construction Company, Enfield, Connecticut. It sure is building a reputation for itself.

"It fills a 12-yd truck every 3½ minutes. Averages 2,700 yd in a 10-hour day. It can be, and has been, pushed to 3,000 yd."

One of the reasons for this fast loading is Tractomotive's *exclusive ONE-LEVER* control of speed and direction. Operator goes into and out of any forward or reverse gear while moving—always works at highest possible speed.

Some of the other reasons for the TL-20's outstanding performance include: LONGER REACH — you dump loads right into center of high truck bodies. GREATER STABILITY — more operating comfort, less spillage. STRONG, PIN-CONNECTED AXLES — no rolling and shifting under load.

See how the TL-20 can increase your production. Your ALLIS-CHALMERS dealer will be glad to show you.

*TRACTOLOADER is a registered Tractomotive trademark.

ALL TRACTOMOTIVE EQUIPMENT IS SOLD AND SERVICED BY YOUR ALLIS-CHALMERS DEALER

TRACTO—

a sure sign
of modern design

TRACTOLOADERS • TRACTOSHovels • TRACTORIPPERS • TRACTOHoEs • TRACTOSIDEBOOMS

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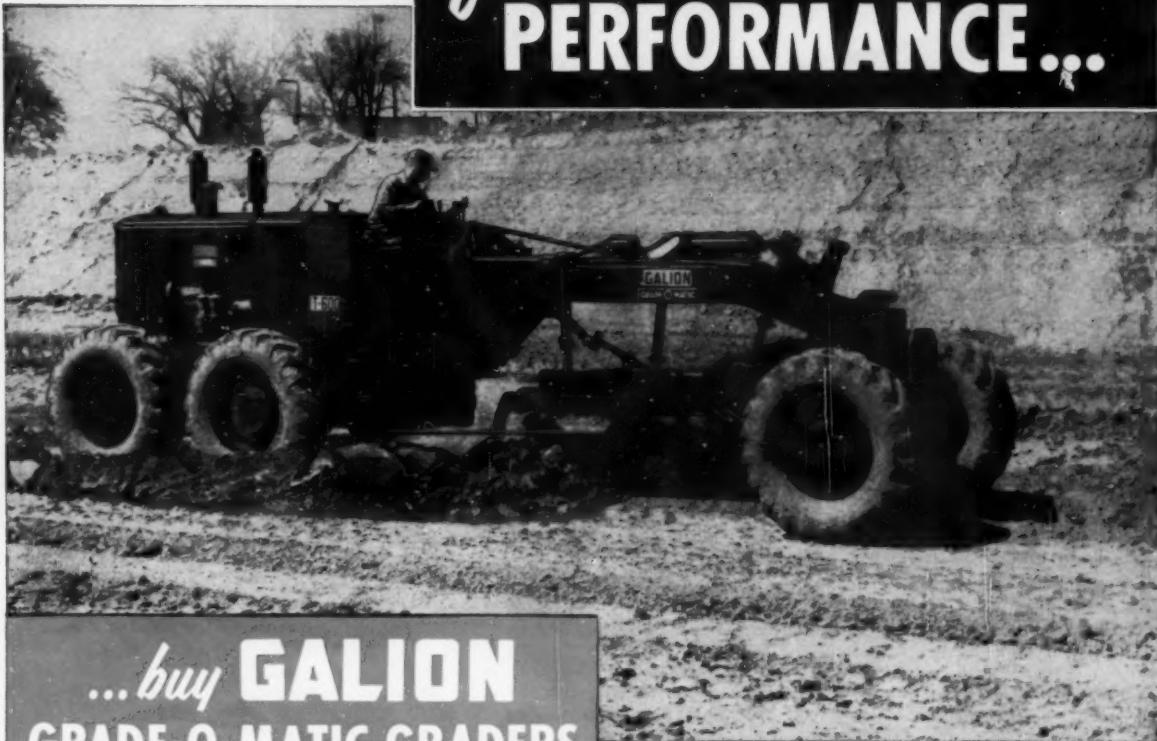
TRACTOMOTIVE

TRACTOMOTIVE CORPORATION • DEERFIELD, ILLINOIS



ROADS AND STREETS, February, 1959

**for TOP
PERFORMANCE...**



*...buy GALION
GRADE-O-MATIC GRADERS
and profit from these features
-at no extra cost.*

- Torque converter drive.
- Power-shift transmission.
- Tail-shaft governor.
- Powerful diesel engines:
T-700, 220 hp. T-600, 150 hp.
T-500, 125 hp.
- Hydraulic shiftable moldboard.
- Hydraulic booster steering.
- Full hydraulic operation with
fingertip controls.
- Same size tire front and rear—
interchangeable.

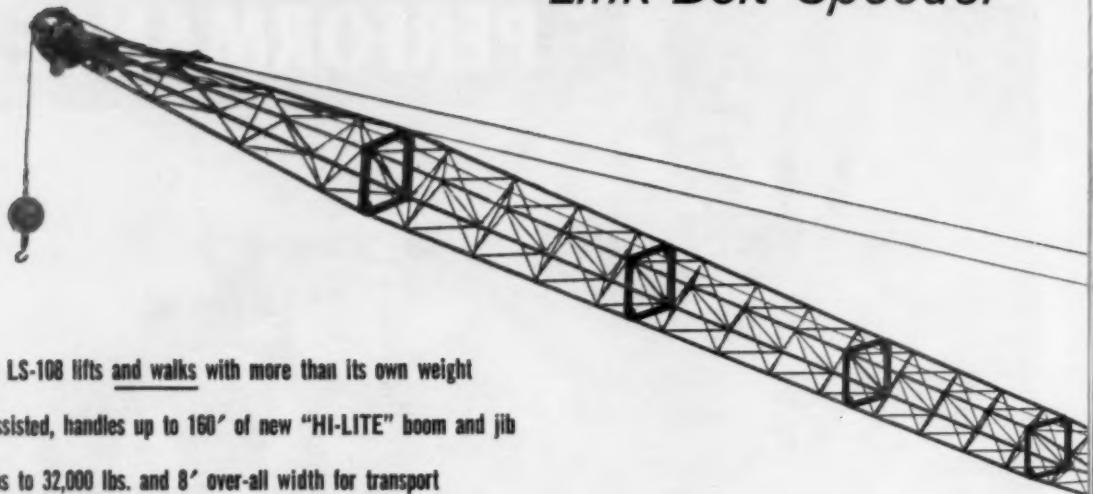
Write for literature.

THE GALION IRON WORKS & MFG. CO.
General and Export Offices—Galion, Ohio, U.S.A.



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Link-Belt Speeder



- New LS-108 lifts and walks with more than its own weight
- Unassisted, handles up to 160' of new "HI-LITE" boom and jib
- Strips to 32,000 lbs. and 8' over-all width for transport in 2 hours or less

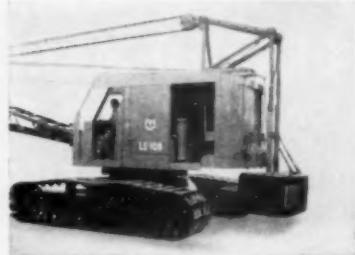
Here's a machine that combines high lifting capacity with exceptional mobility and transportability. Imagine a lifting crane that lifts and walks with 80,000 lbs. and yet quickly strips down for transport from 78,200 lbs. to approximately 32,000 lbs. and an 8 ft. overall width in two hours or less.

In addition, compare this list of lifting crane features with any other crane on the market: power hydraulic controls, two-speed travel in either direction, reversing clutches for either or both main operating drums, independent swing and travel, independent rapid boomhoist with boom-lowering clutch, powerful third drum and many others.

See your Link-Belt Speeder distributor for new catalog and full information or write Link-Belt Speeder Corporation, Cedar Rapids, Iowa.

14,507

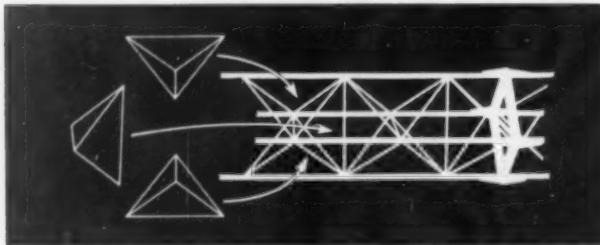
2 hours or less to strip down from 72,800 lbs. to approximately 32,000 lbs. and 8' width for road transport.



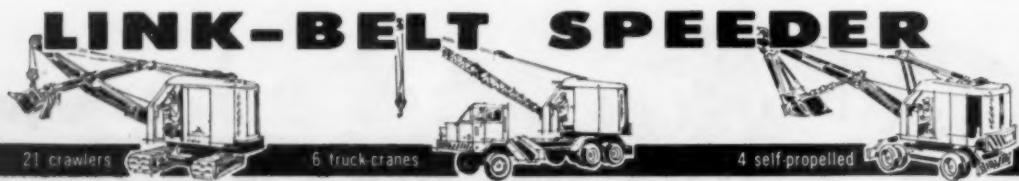
1. Use the powered retractable gantry to remove counterweight.



2. Move LS-108 onto lowboy from the side, taking advantage of power steering.



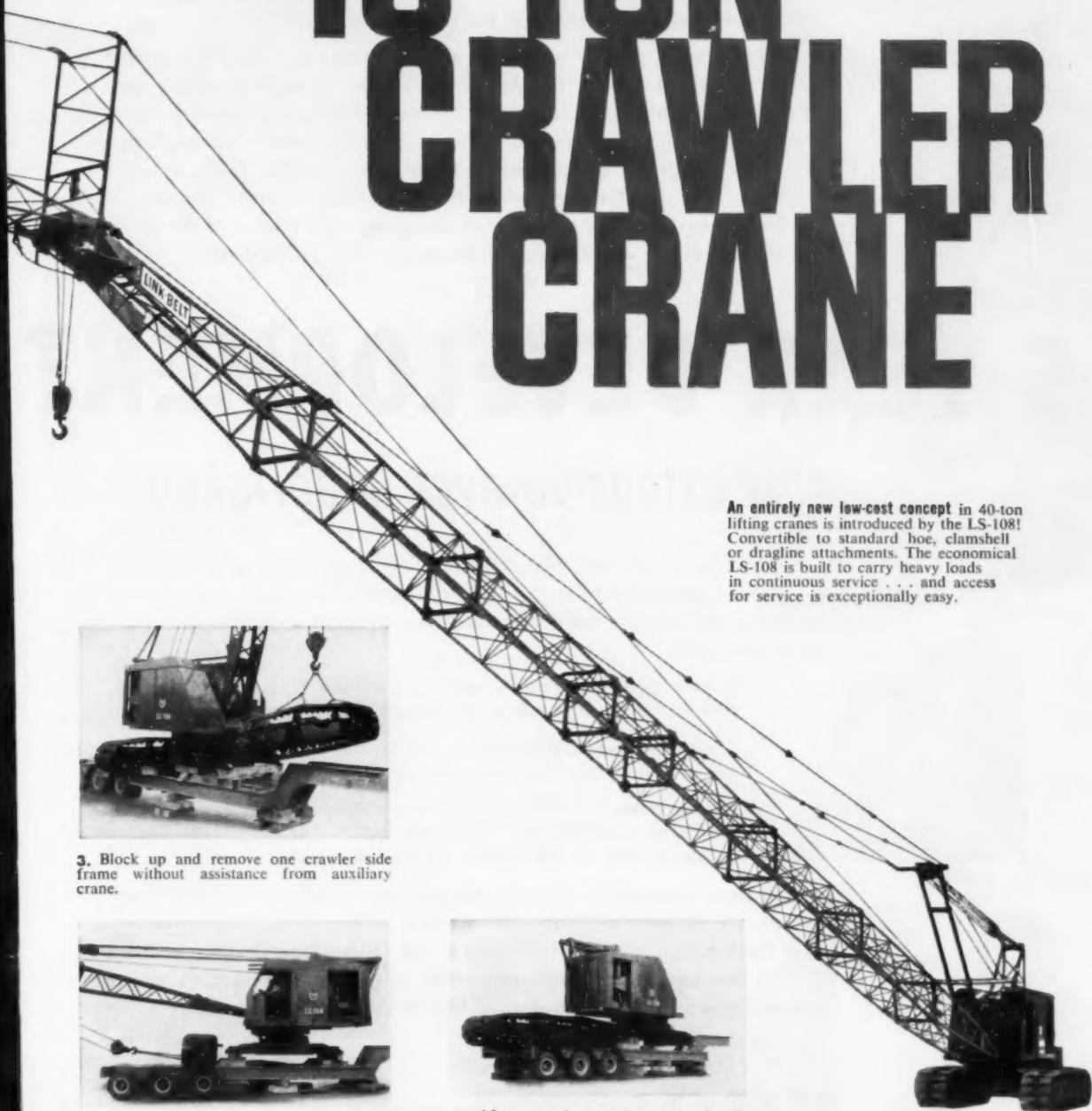
Revolutionary "HI-LITE" booms feature new tetrahedron design that virtually eliminates the effect of whipping, twisting and deflection normally experienced with long booms. Sets of internal cross-braces meet at common points along the 44" square box section forming scores of tetrahedrons (pyramid-like structures) . . . provide maximum resistance to stress in every direction. High-strength steel tubing is light weight . . . permits longer booms than previously possible.



It's time to compare . . . with Link-Belt Speeder

announces

NEW 40-TON CRAWLER CRANE



An entirely new low-cost concept in 40-ton lifting cranes is introduced by the LS-108! Convertible to standard hoe, clamshell or dragline attachments. The economical LS-108 is built to carry heavy loads in continuous service . . . and access for service is exceptionally easy.



3. Block up and remove one crawler side frame without assistance from auxiliary crane.



4. Block up and remove other crawler side frame.



5. After removing attachment (and with crawlers on separate trailer) you are ready to go at only 32,000 lbs. and 8' width.

. . . for more details circle 332 on enclosed return postal card

ROADS AND STREETS, February, 1959

They said it couldn't be done!

FIVE YEARS AGO Euclid started an intensified program of product improvement and development that was far beyond anything that had ever been done in the construction equipment industry. Always a leader in years-ahead engineering that made "Eucs" outstanding performers on the toughest jobs, Euclid anticipated your need for still larger, more efficient equipment to help beat the squeeze on profits.

Without tricky project names or slogans, the development program moved full speed ahead. New machines were put through exhaustive tests at Milford Proving Grounds and the General Motors Tech Center with its unsurpassed testing and research facilities. Then followed actual job operations on a wide range of work...under close check by Euclid product engineers so that further improvements in productive capacity and service life could be made. One by one, new machines were added to the Euclid line as their efficiency, design and reliability were established.

5 YEAR DEVELOPMENT

... most extensive ever undertaken

1954

1955

1956

1957

1958

Now Euclid offers the most complete line of modern, large capacity job-proved earthmovers in the industry. Here's what has been accomplished in the past five years to provide equipment that enables you to bid more profitably:

5 new scraper models with capacities from 7 to 24 yds. struck...other models increased in power and capacity

4 new rear-dump haulers—12 to 35 ton capacities—with major improvements in performance of other models

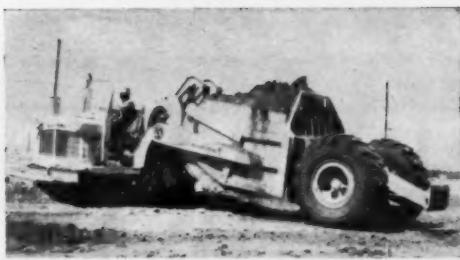
2 new crawlers with a completely new design concept that provides unmatched workability...TC-12 with Twin-Power is the world's most powerful crawler

No matter how small or how big the job, there's a Euclid model that will move yardage more profitably. Before you replace or add to your equipment fleet, get all the facts from your Euclid dealer. He can show you how Euclid's development program can mean lower earthmoving costs and a better return on your investment. EUCLID Division of General Motors, Cleveland 17, Ohio



EUCLID EQUIPMENT

FOR MOVING EARTH, ROCK, COAL AND ORE



◀ S-7 9 yds. heaped

TC-12
402 net h.p.



S-12 17 yds. heaped



C-6
202 net h.p.



S-18
30 yds. heaped



TS-24
32 yds. heaped



SS-24 32 yds. heaped



R-27 27 tons



◀ S-12 RD
22 tons

2 other models of 12
and 35 ton capacities

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11 completely new JOB-PROVED earthmovers

NEW CHEVROLET 4- YOU TO HAUL WHERE



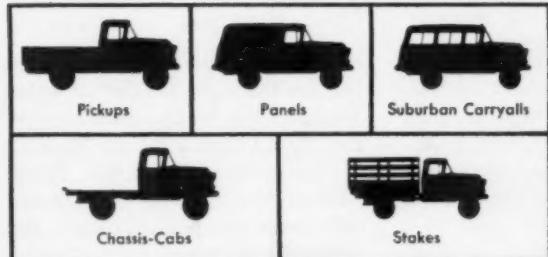
WHEEL DRIVE ENABLES YOU COULDN'T BEFORE!

Chevrolet's new 4-wheel drive really digs in and does it . . . enables you to haul through deep mud, snow, swampy areas and up towering grades. With up to twice the traction, wheels are able to grab hold and go!

An easy shift of a lever . . . and you've got traction that bites in and pulls with the tenacity of a light tank!

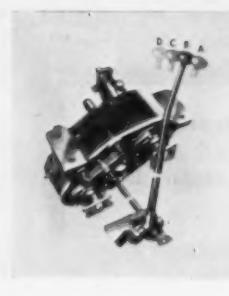
This new Chevy unit is the latest thing in 4-wheel drives. Consisting basically of a rubber-mounted power divider with precision-engineered front axle, it distributes power evenly to front and rear axles. And when the going is extremely difficult, it directs power to whichever axle is getting the best traction. Result: Your load goes through, whether the road does or not!

CHEVROLET 4-WHEEL DRIVE SUITS MANY MODELS



Fourteen tough-built Chevy models whip rough-and-tumble terrain like never before! There are 4-wheel drive *pickups* for ploughing, grading, snow removal jobs, and others . . . *panels* for surveying, delivery, and construction tasks . . . *Suburban Carryalls* for sportsmen and tough cargo-and-passenger-carrying jobs . . . *stakes* for work that calls for heavy back-country hauling . . . and *chassis-cabs* for a broad range of special applications!

EASY SINGLE-STICK CONTROL



One easy motion operates the power divider. Shifting between 2-wheel drive and 4-wheel drive can be done whether the truck is stopped or moving. Lever has these 4 positions:

- a. 4-wheel underdrive
- b. Neutral
- c. 2-wheel direct
- d. 4-wheel direct

POWER FOR SPECIAL EQUIPMENT



Four power take-off outlets permit use of a wide variety of special equipment: saws, generators, winches, pneumatic hammers, post-hole diggers, back hoes, and many more! SAE 6-bolt outlet is on transmission; other outlets are on power divider.

Get complete information on new Chevrolet 4-wheel drive!

MAIL THIS COUPON TO COMMERCIAL & TRUCK DEPARTMENT, CHEVROLET DIVISION OF GENERAL MOTORS, DETROIT 2, MICHIGAN

Name _____

Address _____

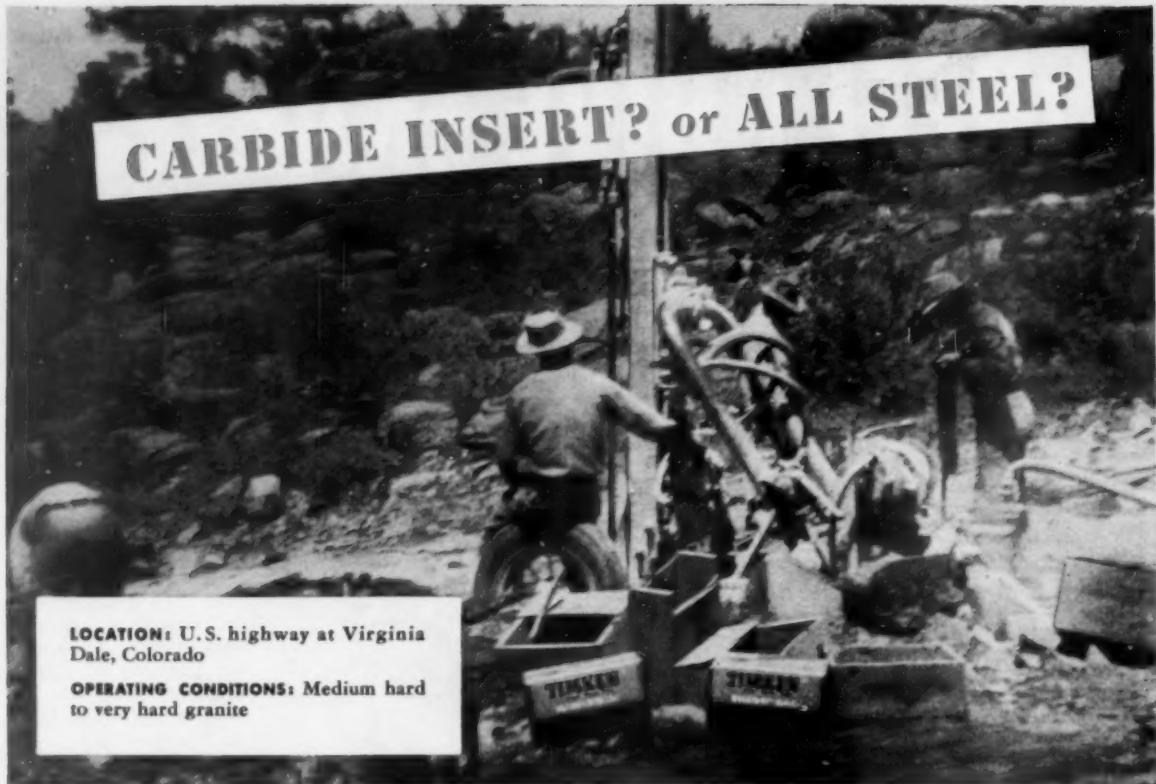
City _____ Zone _____ State _____ (RS-2)

See your nearby Chevrolet dealer about versatile 4-wheel drive in

CHEVROLET TASK-FORCE 59 TRUCKS

... for more details circle 316 on enclosed return postal card

ROADS AND STREETS, February, 1959



LOCATION: U.S. highway at Virginia Dale, Colorado

OPERATING CONDITIONS: Medium hard to very hard granite

"We switch our **TIMKEN®** bits and drill up to 10 inches per minute in granite"

. . . Reports Northwestern Engineering Co.

GRANITE in varying hardness—that was the problem facing Northwestern Engineering Co., of Denver, in drilling the blast holes for relocation of the U.S. highway at Virginia Dale, Colorado. They solved the problem by using Timken® all steel multi-use bits in the *medium-hard* granite—then switching to Timken carbide insert bits for the *very hard* granite. And they averaged 6 to 10 inches per minute!

Switching your Timken bits like this can prove economical for you, too. Timken carbide insert bits are your best bit for drilling in hard,

abrasive ground. But in softer ground use Timken all steel multi-use bits. Both bits are interchangeable in the same thread series. Without changing drill steels, you can change bits quickly and easily as the ground changes.

All Timken rock bits are made from world-famous Timken fine alloy steel. And for even longer life, Timken bits have a specially developed shoulder union that protects threads against drilling impacts.

Get all these advantages by using bits made by the world's largest manufacturer of removable rock

bits. Timken bits! For help in selecting just the right bit, call or write Timken Rock Bit Engineering Service, The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". Makers of tapered roller bearings, fine alloy steels and removable rock bits.



Timken threaded all
steel multi-use rock bit



Timken threaded
carbide insert rock bit

TIMKEN®

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ROADS AND STREETS

Sixty-Six Years of Editorial Leadership



Washington News Letter

Exclusive - By Duane L. Cronk, Director, Highway Information Services

February 10, 1959

A well-organized chorus of protest has greeted the Administration's proposal that the federal gasoline tax be increased by 1½ cents to make up the deficit in the Highway Trust Fund. Every highway user group in the land has been clearing its throat and running the scale for weeks in anticipation of the suggestion, and by the time President Eisenhower formally recommended the tax levy in his budget message, they were prepared to raise their voices in unison against it. They harmonized well in the protest passages, but solo suggestions for an alternate plan to meet the financial crisis were so low as to be inaudible.

Everyone is coming in strong on the refrain: 'Let's wait till after the AASHO Test Road results are in before we talk about more user taxes. Until then, we don't have anything 'scientific' on which to base highway user taxes."

(The big Illinois test will be completed in two years, after which these same interests will want two years to evaluate it, and another two years to discredit it.)

* * *

Organization of the new Congress finds a lot of new faces on the vital public roads committees. Senator Albert Gore, former chairman of the Senate Subcommittee on Roads, has yielded that post to Pat McNamara of Michigan. The Democrats outnumber the Republicans 7 to 4 this session. Besides McNamara, other Democratic members are Jennings Randolph of W. Va., Robert Kerr of Okla., Richard Neuberger of Ore., Edward Muskie of Maine, Ernest Gruening of Alaska, and Frank Morse of Utah. Republicans on the subcommittee are John Cooper of Ky., Thomas Martin of Ia., Hugh Scott of Pa., and Winston Prouty of Vt.

On the House side, Congressman George Fallon will continue to chair the Roads Subcommittee (with a Democratic majority of 12 to 6). These are the men who will steer the National Highway Program by new legislation during the next two years.

A score of new governors around the country who have just taken office are shaking up their highway departments and the industry is finding itself dealing with new chief engineers and commissioners in a number of states.

For examples: Ohio's \$30,000-a-year highway director, Charles Noble, has been replaced by E. S. Preston, former design engineer of the department and more recently chief of Photronix, Inc. Mr. Noble reportedly will return to consulting practice in New Jersey . . . Park H. Martin has been named to the top post of the Pennsylvania State Highway Department . . . L. N. Ress is out as state engineer for the Nebraska road department. His replacement, R. L. Cochran, a

(continued on next page)

former governor and state engineer for 12 years . . . In California, Robert B. Bradford has been appointed new director of public works, replacing C. M. Gilliss . . . John Johnson has given way as superintendent of public works for New York State to J. Burch McMorran. Henry TenHagen will take Thomas Fitzgerald's place as chief engineer.

In other states, Sam Englehardt, Jr., will take over as highway director of the Alabama department, replacing Herman Nelson . . . R. B. Winfrey is serving as acting director of highways in Arkansas since Herbert Eldridge's departure . . . A replacement is being named to take the place of T. J. Heimann, chairman of the New Mexico State Highway Department . . . G. H. Bittle is acting director of the Oklahoma department, replacing C. A. Stoldt . . . Joseph Vallone is out as director of public works for Rhode Island. New man is Angelo A. Marcello . . . In South Dakota, Charles Daltherpe is being replaced . . . A turnover of the Tennessee Highway Department finds D. W. Moulton picking up where the extremely capable W. M. Leech "left off." And in Georgia, James Gillis has been named chairman of the State Highway Board.

* * *

Democratic leaders here are going to the mat with President Eisenhower over the airport construction program. The Administration included a provision of \$65 million in the new budget with diminishing amounts for the next four years. Mr. Eisenhower has repeatedly said that future federal-aid should be discontinued. The Democratic majority in Congress has just as forcefully asserted that Uncle Sam must get into this program deeper. President Ike vetoed their airport bill last session, but the Congressmen are back with others already.

They started hearings last month in the Senate to consider a bill submitted by Senator Mike Monroney of Oklahoma. Monroney's proposal would have the federal government commit \$100 million a year to new airport construction, to be matched 50-50 by local and state bodies. This would go on for five years. In addition, Monroney wants a fast shot-in-the-arm (\$75 million) to upgrade existing runways and other facilities for impending jet traffic. He has plenty of supporters, among them new Senator Jennings Randolph, who until his election was treasurer of the American Road Builders Association.

(Both the Administration and the Democratic forces are agreed on one point, namely that less of the available money should be spent on accessory facilities, more on runway construction.)

Watch for . . .

- A complete review of labor usage in the highway industry. The BPR is making a state-by-state analysis of contractor payrolls. Their objective: To determine just how much the various crafts are being employed on roadbuilding jobs and the prevailing wages. Results will be fully reported in this column.
- A fresh attempt to bring the nation's highway contractors together under one tent. Officials of both ARBA and AGC say they are more than willing to compromise differences and duplication of effort in such vital areas as labor, legislation and inter-industry relations, if at all possible. More about this next month.
- A comprehensive plan under which highway contractors would organize to help dig out America's vital cities and industrial areas after an atomic attack. Defense officials are taking a new tack, now believe that a nation might survive a ballistics missile nuclear attack and construction men would be the key to quick recovery. It's in the works.

A Special Roads and Streets Report

WHAT THE AGC AND ARBA CONTRACTORS TALKED ABOUT
AT MIAMI BEACH AND DALLAS CONVENTIONS

Hundreds of highway contractors, local highway officials, equipment manufacturers and materials producers got together at two national conventions last month to explore the current highway market and search out solutions to problems of financing, labor, and engineering. In Miami Beach, the Associated General Contractors reeled off a solid week of meetings. In Dallas, speakers at the American Road Builders Association convention aired current issues facing the broad roadbuilding industry.

Here is a sampling of what was said and done at both sessions. More complete coverage will follow in later issues of Roads and Streets.

* * *

You can look forward to bidding for road work on the moon within 15 or 20 years, a leading missile expert told highway contractors at the AGC convention. Dr. Wernher von Braun, a top scientist in the Army's ballistic missile program, ventured that construction on the moon will begin with the first rocket landing (building a base for return take-off). And soon thereafter there will be "extensive construction work undertaken, including some roadbuilding."

In the meantime, the U.S. shift from overseas airbase construction to U.S. missile launching facilities is creating an immediate market for contractors that is new - and complex. General E. C. Itschner, Chief of the Army Corps of Engineers, declared that the armed forces are engaged literally in a construction program "for survival." He predicted that the new effort would call for a number of new missile bases dispersed around the country, and that this type of project will gradually replace military airfield jobs. The Corps will place nearly half-a-billion dollars worth of contracts for missile construction for the Air Force alone this year, and another \$119 million worth for the Army.

* * *

There must be continued flexibility of depreciation allowances on roadbuilding equipment, the AGC contractors maintained in a resolution directed to the attention of the Internal Revenue Service. Delegates to the meeting agreed that the basic depreciation guide, Bulletin "F", needs to be updated to include new machines, but that it should be considered only a "starting point" from which contractors and the IRS can reach an agreement on specific allowances.

The roadbuilders feel that "wear-and-tear" on their equipment varies so widely from job to job and year to year that they would rather work out their depreciation angles with IRS field offices, than submit to inflexible formulas written in Washington.

The contractors also commended the cement industry for the "firm price" policy it announced for 1959 and urged other producers to follow this lead. "Nothing is

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trickier in a contractor's cost control picture than the fluctuation of materials prices," one prominent Eastern contractor said. "If some of the uncertainty and inflation besetting the road program could be reduced in the materials market, we would all be able to reduce our contingencies a bit."

Contractors have got to get together on uniform safety codes and procedures for moving traffic around highway jobs, Sheldon Carlson (Park Construction Co., Minneapolis), member of the AGC Accident Prevention Committee, told a meeting of the Highway Division. He pointed out that signals and signs vary so drastically from state to state that motorists are confused and angered. The contractor invariably becomes the object of their indignation. It's up to the industry to nudge state highway departments toward acceptance of uniform practices that will eliminate this source of irritation, he said. Max Harrison, president of the Harrison Construction Co., Pittsburgh, agreed, "If we don't institute reasonable safety codes to provide for traffic around our projects, we can expect that unreasonable demands will be shoved on us."

* * *

The average profit of 1½ to 2% which characterizes the highway contracting industry is too low to permit many firms to stay in business for long, Nello L. Teer, Jr., newly elected president of ARBA, told the gathering in Dallas. This is not nearly enough to permit a roadbuilder to easily purchase the equipment needed to keep his production plant modernized. "Fortunately, some of the financing houses have foreseen these problems and there are many programs available to assist the contractor," he said. Speaking of "pay-as-you-depreciate" plans now in vogue, however, he said, the contractor must still allow for a "very high total interest."

The highway contractor's most nagging worry is that of working capital. The large majority of firms in the industry are under-capitalized, he claimed. Somehow highway officials must be impressed with the importance of paying contractors promptly.

"Many states have made no effort to establish helpful pay procedures," he said. "They are too engrossed in their internal policies or lack the foresight to realize that the contractor's financing problems are directly related to their own."

Such shortsightedness creates costs which ultimately the department pays - the high cost of interest when the contractor must borrow to see him through long waiting periods, and the high cost of bankruptcy. "It's mandatory that all highway departments adopt a modern, streamlined, efficient method of paying their contractors and paying them on time," Teer concluded.

* * *

Delegates to the ARBA confab in Dallas took aggressive action on a number of fronts to assure an increasing level of highway construction volume. Among other things, they went on record to: Favor even greater authorizations for road work on federal-aid ABC systems, and recommend suspension of the Byrd amendment to permit bond financing for replenishment of the Highway Trust Fund . . . Request Congressional approval of a federal-aid airport construction program which would obligate at least \$100 million annually for the next five years . . . Oppose the extension of the federal Davis-Bacon Act to contractor operations on the ABC systems . . . Oppose the "dumping" of foreign surplus construction equipment on the American market and its sale to American contractors . . . Oppose the use of federal funds for location of aggregates for road work . . . Advocate the utilization of private engineering organizations to expedite the National Highway Program and assure maximum efficiency.

This scraper is one of a fleet operated by Ball and Simpson, contractors of Berkeley, California. The equipment works 16 hours a day hauling 25-ton loads of dirt and rock for a new superhighway. The company keeps this project on schedule by using B.F.Goodrich Rock Service tires. The report: even under tire-killing work conditions, Rock Service tires cut delays to a minimum—give as many as 2,000 hours' service before retreading.



B.F.Goodrich Rock Service prevents unnecessary tire failures!

THE new B.F.Goodrich Rock Service —unlike an ordinary tire—is built to its inflated shape. This FLEX-RITE construction permits *uniform* flexing—no localized stresses that often cause unnecessary tire failures!

Look at the husky double chevron tread. The cleats bite in to give maximum traction and skid resistance in forward or reverse. Under the tread is the B.F.Goodrich FLEX-RITE NYLON cord body. It withstands double the impact of ordinary materials, resists heat blowouts and flex breaks. The B.F.Goodrich FLEX-RITE NYLON body outwears even the extra-thick Rock Service tread, can be retreaded over and over! No wonder the B.F.Goodrich Rock Service tire gives longer service in mine, quarry or dirt-moving jobs!



Western Contracting Corp. operates 2,000 vehicles to build highways, dams and air bases all over the country. Here the job is earth moving for a new runway at Wright-Patterson Air Force Base, Fairborn, Ohio. B.F. Goodrich Rock Service tires have substantially increased hours of service and substantially reduced delays due to tire failure (saving between \$300 and \$600 per hour, the company reports).

Opens up new opportunities

Smileage!



Call the district office nearest you for **B.F.Goodrich tires and tire service**

Albany, New York	4-7181	Fargo, North Dakota	AD. 2-7462	New York, New York	OR. 9-0330
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Needham Heights, Mass.	HI. 4-6100	Houston, Texas	CA. 7-5228	Pittsburgh, Pennsylvania	HI. 1-5200
Buffalo, New York	RI. 1258	Indianapolis, Indiana	ME. 7-2508	Portland, Oregon	CA. 6-3621
Charlotte, North Carolina	EX. 9-5621	Jacksonville, Florida	EL. 6-4167	Richmond, Virginia	EL. 5-6573
Chicago, Illinois	ES. 8-8800	Kansas City, Kansas	MA. 1-4400	St. Louis, Missouri	PR. 3-2600
Cincinnati, Ohio	BR. 1-7800	Los Angeles, California	RA. 3-6692	Salt Lake City, Utah	DA. 2-2405
Cleveland, Ohio	PR. 1-0827	Memphis, Tennessee	WH. 8-6761	San Antonio, Texas	CA. 7-7543
Columbus, Ohio	AM. 8-8631	Milwaukee, Wisconsin	DI. 4-5104	San Francisco, California	AT. 2-9620
Dallas, Texas	RI. 1-5601	Minneapolis, Minnesota	LI. 5-2521	Seattle, Washington	MU. 2-4300
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Specify B.F.Goodrich Tubeless or tube-type tires when ordering new equipment. *B.F.Goodrich Tire Co., A Division of The B.F.Goodrich Co., Akron 18, Ohio.*

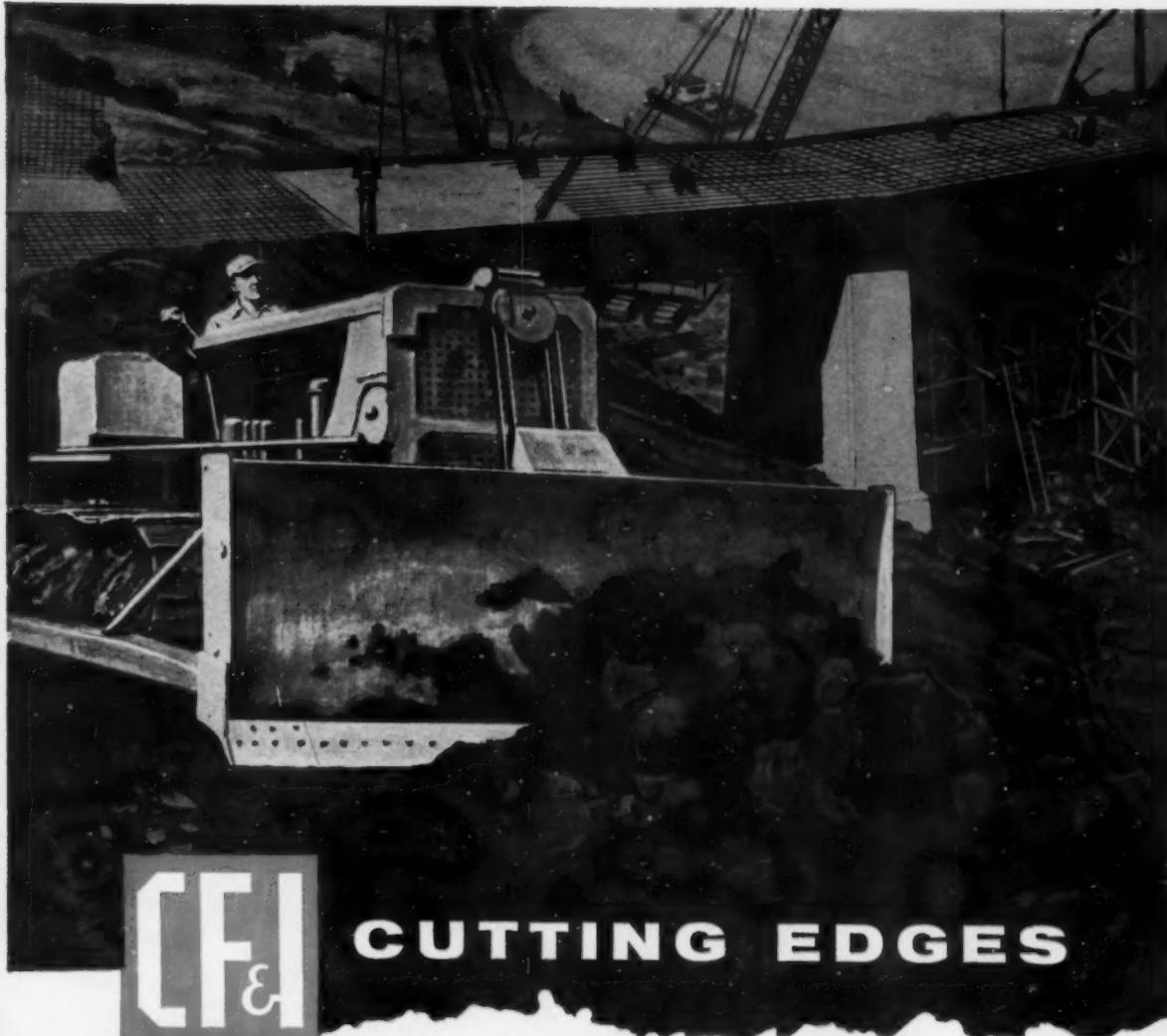
Enter the B.F.Goodrich Truck Tire Mileage Contest. You can win a Thunderbird, or Corvette, or one of 310 other prizes. See your B.F.Goodrich dealer today for entry blanks.

B.F.Goodrich truck tires

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WITH THE NEWEST, BIGGEST OFF-THE-ROAD**

for tire savings



CUTTING EDGES

CUT DOWNTIME

On earthmoving projects there is nothing more costly than lost time due to idle or poor equipment. Blade or cutting edge failures often result in work stoppage and higher costs, especially when replacement parts are not readily available.

To reduce blade failures, lower operating costs and improve profits, more and more contractors are using CF&I Cutting Edges. Made of special analysis steel, these rugged, dependable-service blades have the endurance and long-wearing qualities necessary to assure the greatest number of operating hours per dollar of blade cost.

CF&I maintains an inventory of more than 4000 cutting edge blueprints to meet your requirements. They are available in a variety of curved or flat

sections, widths and thicknesses . . . produced to exact specifications for fast and efficient on-the-job installation. For complete details contact your nearest CF&I sales office.



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Albuquerque • Amarillo • Atlanta • Billings • Boise • Boston • Buffalo
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INTERNATIONAL TRUCKS



TOUGH AND READY

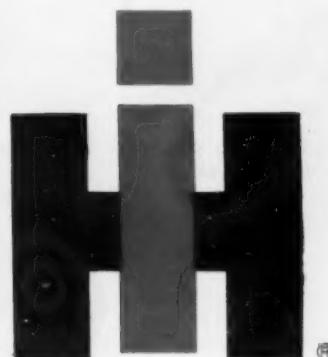
Where
muscle
makes a road!

Built for keeps to keep highway building on the move, this INTERNATIONAL model RDF-230-H is tough . . . ready to go anywhere, do anything!

A high-torque, low rpm Cummins NH-series diesel engine and rugged axles (46,000 lb. tandem rear and 15,000 lb. front) bull back-breaking loads over washboard terrain with sure dependability — round the clock, if necessary.

Take a good look at its extra-heavy-duty diamondette sheet metal, heat-treated alloy double-channel frames, simplified steering geometry that makes for flat angle, low friction ease of handling. You'll know why more heavy-duty construction operators are counting on this INTERNATIONAL Truck.

See your INTERNATIONAL Dealer today! He's got the know-how and *the truck that's got it* for your job!



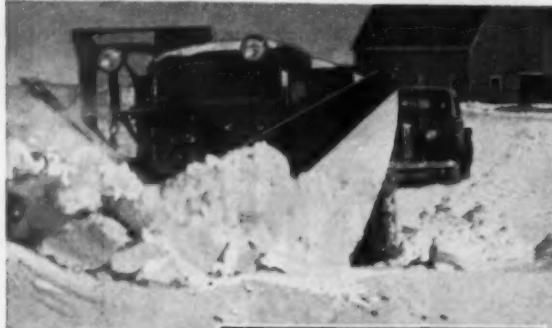
INTERNATIONAL HARVESTER COMPANY, CHICAGO
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick®
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cost least to own!

... for more details circle 325 on enclosed return postal card

ROADS AND STREETS, February, 1959

Snow Removal a Problem?



Think of **FRINK**
Specialists Since 1921 in
SNOW PLOW
KNOW-HOW

Since the first steel plow (a Frink) hit the highway 36 years ago, every major advance in snow plow design and performance has been a product of Frink "know-how." Today there are four basic types of Frink Sno-Plows, each with models to fit trucks from 1½ to 12 tons, and most are interchangeable on the same attachment.

Whatever your area's snow removal problem, Frink makes THE plow best equipped to do the job faster, safer and at lower operational cost for plow and truck.

Learn all the facts and reasons why so many cities, towns, counties and states specify Frink Sno-Plows. See your distributor or write to Frink for descriptive folders about these plows.



V-TYPE SNO-PLOW
—rugged powerhouse for high-speed, heavy-duty highway work; leveling wings optional.



ROLL-OVER with Taper Blade
—for airports, expressways; rotates left or right in seconds; ends "dead-heading."



ONE-WAY with Trip Blade
—for high-speed throwing and spreading, but winds rows neatly at city speed.



REVERSIBLE Trip Blade
—all-purpose; plows left, right, bulldozes ahead; power reverse lever in cab.

For Snow Plow Know-How
It Pays to Think of

FRINK
SNO-PLOWS

Clayton, 1000 Islands, N. Y.
Frink Sno-Plows of Canada, Ltd., Toronto, Ontario

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Personals



• Goodyear's President, Russell De-Young Presenting 40-Year Pin to J. T. Callaway.

Callaway of Goodyear Gets 40-Year Pin

J. T. (Tom) Callaway, assistant to the vice president of manufacturers sales for Goodyear Tire & Rubber Co., Chicago has been honored by his associates for 40 years of distinguished service with the rubber firm. Callaway, who is a pioneer good roads booster, is a past president and director of both the Construction Industry Manufacturers Association and the American Road Builders Association.

Julien Steelman Heads International Road Feder

Julien R. Steelman, president of The Koehring Company of Milwaukee is elected chairman of the Board of Directors of International Road Federation, world-wide road promotional body, with headquarters in Washington.

He succeeds H. S. Merriman, who has retired from the Socony Mobil Oil Company.

MANLEY OSGOOD, a pioneer road builder in Michigan and long-time head of Ann Arbor Construction Co., died recently while on a visit in Arizona. He was a charter member of the Michigan Road Builders Association and the Michigan Asphalt Paving Association, and had served both organizations as president.

Test Road Movie

A three-minute movie on the AASHO test road project in Illinois was seen by numerous delegates attending the recent meeting of the American Association of State Highway Officials in San Francisco.

The kinescope film of a recent television message dramatized the significance of this project, which is the most comprehensive road testing project ever undertaken. The AASHO project was depicted for a nation-wide TV audience on a United States Steel program.

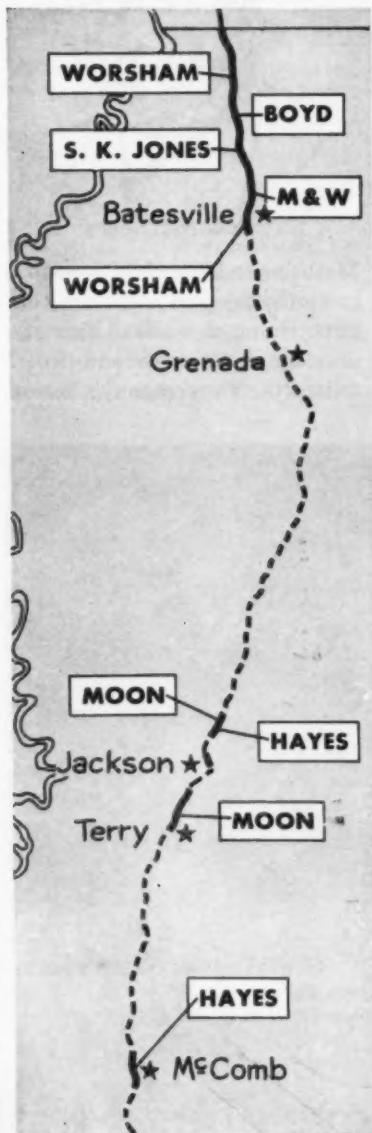
A print of the film for the AASHO national headquarters library was accepted by Harold L. Plummer, commissioner of highways for the state of Wisconsin, chairman of AASHO's committee on public information.

CONTRACTORS FIGHT "WORST WEATHER IN HISTORY" TO

Punch new interstate main line through Mississippi

With big fleets of Allis-Chalmers construction machinery, contractors battle wet weather to move millions of yards of tough Mississippi clay, mud, sand and gumbo. More than 140 miles of the state's 676-mile proposed interstate system is currently completed, under construction, or awarded. The main line is U.S. 55 which runs generally

parallel to U.S. 51 from the Tennessee line near Memphis south through Jackson to the Louisiana line. The new road will have a minimum of four lanes, be controlled access and are planned for expansion to six or eight lanes, if necessary. A check of the jobs in progress shows some of the problems . . . and how the contractors are solving them.



Worshams Work Near Tennessee Line

Worsham Brothers, contractors from Corinth, Mississippi, are working a five-mile section of U.S. 55, between Aldens and Hernando, Mississippi, near the Tennessee line. About a million yards of dirt is involved in the \$986,000 contract. An additional four-mile section of U.S. 55, immediately south of Batesville, has been awarded to Worsham Brothers on a bid of \$923,000. Work will begin in the early spring. The firm, a partnership of three brothers, Frank, Clifford and LeRoy, specializes in airport and highway construction in Mississippi, Alabama and Tennessee. The Worshams are using big tractors, motor scrapers and motor graders from their Allis-Chalmers fleet to



Frank Worsham, Jr.

keep the Interstate 55 job well ahead of schedule. Moving 9,000 to 15,000 yards every 10-hour shift, the company is making the most of every working day. By October, 1958, they had completed 62% of the work, with only 52% of the contract time elapsed.

(Continued on next page)



Heaped scrapers kept constantly on the go during the rare dry periods is the Worsham Brothers formula for beating bad weather and tough dirt.

...move ahead with **ALLIS-CHALMERS**

Punch Main Line Through Mississippi

Boyd Builds Highways on the Run

Averaging up to 18 miles per hour — hauling 12,000 to 17,000 yards of sandy silt every 10-hour working day — keeps the Boyd job ahead of schedule. The Boyd Construction Company, Grenada, Mississippi, is working a seven-mile section of U.S. 55 between Coldwater and Senatobia. Eighty percent of the yardage is being handled by Allis-Chalmers TS-360 motor scrapers — with fast, effective loading boosts from Allis-Chalmers HD-21 crawler tractors.

Moving earth at high speed is a Boyd specialty. The company, in business since 1939, handles contracts averaging 1½ to 2½ million dollars annually, covering general highway and bridge construction and earth moving, as well as levee work on the Mississippi River.

On the U.S. 55 job, more than 2¼ million yards of fill are being



John Boyd

moved from borrow pits to build a 4-lane roadway across the headwaters of the Arkabutla Reservoir.

Unusually wet weather permitted only 20 working days during the first 5 months of last year. Now, Boyd is counting on his Allis-Chalmers machines to make up for lost time. The big TS-360's hauling 7 to 9 loads per hour on cycles up to 2 miles, are averaging up to 1,400 yards every 10-hour working day. The sandy silt coming out of a 2,000,000-

yard borrow pit is running 3,000 pounds to the yard — yet Boyd's TS-360's are making excellent time in spite of spongy haul roads.

Wet Clay Complicates M & W's Section

W. C. Mathews and H. M. Whitfield are M & W Contracting Company of Tupelo, Mississippi.



W.C. Mathews

Mathews and Whitfield specialize in earthwork and structure construction on all types of highway, drainage, water, sewer and airport contracts. The company's fleet of



High-speed hauling helps the Boyd Construction Company keep its sections ahead of schedule. These 20-yd Allis-Chalmers motor scrapers average 7 to 9 loads an hour on cycles up to 2 miles.

...move ahead with

Allis-Chalmers motor scrapers, tractors and motor graders is rapidly completing the last cut and fill on the company's 5½-mile section of U.S. 55 during a mid-November survey of the job.

The \$1,832,000-contract calls for 1,300,000 yards of excavation and 10 structures. Two of the structures are connected with a channel change on the Talahatchie River, where a horseshoe bend will be straightened and the old bed filled.

Mathews pointed to two reasons for this being his toughest stretch of road since his stint, during World War II, on General Pick's staff, building the Ledo Road in Burma. The two obstacles — wet weather and a subsurface strata of heavy red clay that stayed wet, even during the rare dry periods. The clay strata hampered all contractors working Mississippi's interstate main line U.S. 55 from the Tennessee line south to Batesville. Beginning two to three feet below the surface, it ran down far enough to plague most of the cutting operations. Invari-

ably, Mathews pointed out, we'd get down to grade just as we were getting to good dirt!

M & W's Allis-Chalmers fleet helped beat both problems by moving heaped scrapers of the tough clay on a 10-hour-a-day, 6-day-a-week schedule . . . whenever weather permitted. Both men and machines performed so well that M & W's section is well ahead of schedule — 58% complete, with only 34% of contract time elapsed by October, 1958. This kind of performance is one reason for M & W's standardization on Allis-Chalmers construction machinery in the twelve years since they went into business.

S. K. Jones Awarded Four-Mile Section

The four-mile section between Senatobia and the State-Panola County line was awarded to S. K. Jones Construction Company, Memphis, Tennessee. The company began work with its Allis-Chalmers fleet in December, 1957, and with more than 900,000 yards

of material to move, has managed to stay on schedule during the prolonged wet weather. The Jones Company's contract figure of about \$641,000 includes four structures.

Moon Works Three Subcontracts for Interchanges and Frontal Roads

John H. Moon & Sons, Ridgeland, Mississippi, holds subcontracts on three sections of the new interstate main line. Two of these,



John H. Moon

between Jackson and Ridgeland and at Byram, Mississippi, call for structures only. The third, a four-mile section between Jackson and

(Continued on next page)



(Left) One of M & W's Allis-Chalmers motor graders handles finish grading in the cut. (Right) Top maneuverability of Allis-Chalmers motor scrapers lets M & W's big tractor-scrapers load in both directions . . . saves time by reducing travel for pusher tractors.



ALLIS-CHALMERS...power for a growing world

Punch Main Line Through Mississippi

Terry, is for construction of two underpasses and four frontage road bridges to convert present U.S. 51 to the controlled access U.S. 55. More than 630,000 yards of excavation is required. Moon is using medium-sized Allis-Chalmers motor scrapers and Allis-Chalmers crawler tractors to handle the earthwork — building frontal roads, approaches to overpasses and cutting drainage ditches. His hydraulically controlled scrapers, with positive down pressure — available only in Allis-Chalmers motor scrapers — are very effective on close-quarter ditch work where deep, short cuts are required. October reports show Moon has completed 47% of the work in only 33% of contract time.

Hayes Has Two Main Line Jobs

In each of the past ten years, J. R. Hayes Construction Company, Paris, Tennessee, has moved 10,000,000 yards of earth — or more. In addition to its highway



J.R. Hayes

contracts, the company handles clay stripping, street and airport work and asphalt paving in Mississippi and Tennessee. Right now, the firm is under contract to move a total of 5,000,000 yards on five jobs.

One of these is the 7½-mile section of interstate highway 55 near McComb, Mississippi—more than 1,500,000 yards to be moved in 360 workingdays. Hayes' fleet



Positive, hydraulic down pressure on the scraper bowl and plenty of push from the Allis-Chalmers torque converter crawler help operators cut a short deep drainage ditch on John H. Moon & Sons' job.



Three of J. R. Hayes' big Allis-Chalmers TS-360 motor scrapers are shown in the cut. Loads like the one on the right, plus excellent cycle time, helped keep work ahead of schedule in spite of bad weather.

...move ahead with

of Allis-Chalmers TS-260 and TS-360 motor scrapers moves as much as 15,000 cubic yards per 10-hour day — more than 100 loads per day per machine with hauls ranging from 500 yards to a mile (one way). With this kind of performance, Hayes expects to complete the job ahead of schedule, in spite of bad weather.

Another Hayes job on the Mississippi main line is a three-mile section between Jackson and Ridgeland. The \$159,000-subcontract calls for more than 452,000 yards of excavation to rebuild the existing two-lane road, add a second double-lane roadbed and con-



Hayes' fleet of Allis-Chalmers large and medium-sized motor scrapers heap loads in fast . . . average more than 100 loads per day per machine on hauls up to a mile.

struct access roads to bring the existing U.S. 51 up to interstate specifications.

As the story indicates, Mississippi highways are moving ahead at a rapid pace with Allis-Chalmers construction machines in the thick of the action. Performance on jobs like this proves their work capacity as the national highway system spreads across the country. Ask your dealer to show you Allis-Chalmers equipment at work on the big jobs in your area. Then, talk to the owners for the real low-down on Allis-Chalmers production ability. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

Machines like these set the pace

TS-360

20 yd heaped
280 hp
49,050 lb (approx.)



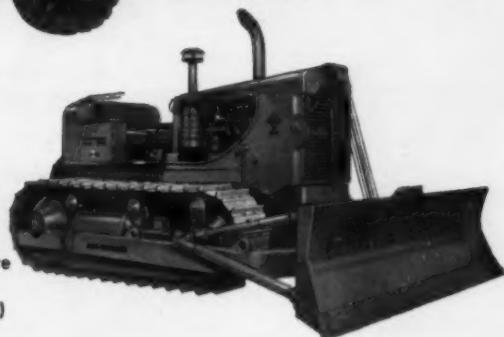
TS-260

17 yd heaped
230 hp
39,600 lb (approx.)



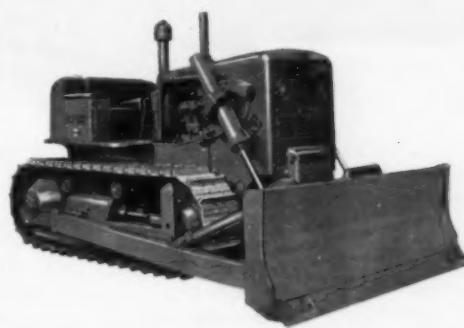
HD-21

225 net engine hp
Torque converter drive
56,260 lb
(approx. as shown)



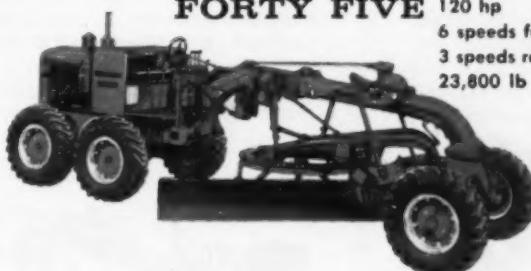
HD-16

Torque converter drive
150 net engine hp
39,090 lb
(approx. as shown)
All-gear drive
148 net engine hp



FORTY FIVE

120 hp
6 speeds forward to 20.6 mph
3 speeds reverse to 7.0 mph
23,800 lb (approx.)



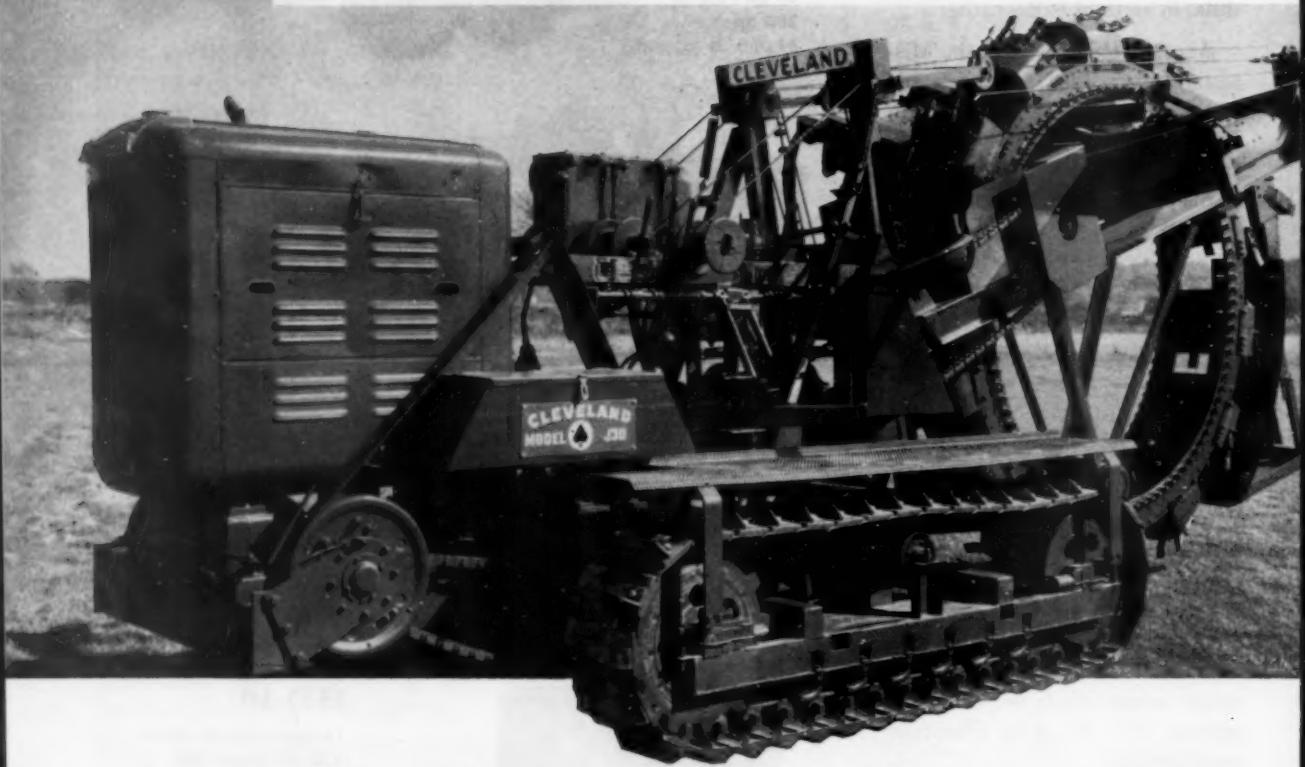
ALLIS-CHALMERS ...power for a growing world

. . . for more details circle 278 on enclosed return postal card



Announcing

3 GREAT NEW



The J-20

Width over crawlers 4' 10"
 Crawler length, C.C. 6' 3"
 Overall length 21' 6"
 Width of crawler shoe 10"
 Weight approx. 13,500 lbs.
 Ground bearing pressure 8.8 psi.
 Cuts trench 13" to 24" wide, to 5' 6" deep
 Principal applications:
 urban areas, utilities lines, services,
 extensions, mains, house footings, etc.



The J-30

Width over crawlers 6'
 Crawler length, C.C. 6' 9"
 Overall length 22'
 Width of crawler shoe 14"
 Weight approx. 15,000 lbs.
 Ground bearing pressure 6.5 psi.
 Cuts trench 13" to 24" wide, to 5' 6" deep
 Principal applications:
 suburban areas, drainage, utilities, gathering
 lines, footings, septic tanks, leach beds.



The J-40

Width over crawlers 8'
 Crawler length, C.C. 7' 6"
 Overall length 23'
 Width of crawler shoe 18"
 Weight approx. 18,800 lbs.
 Ground bearing pressure 5.6 psi.
 Cuts trench 17½" to 30" wide, to 5' 6" deep
 Principal applications: trench up to 30" wide
 — pipelines, waterlines, drainage, irrigation,
 sewer lines, utilities.



...with the basic Cleveland characteristic...

...for more details circle 296 on enclosed return postal card

Quality

CLEVELAND TRENCHERS

with ...revolutionary new **V** conveyor

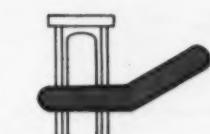
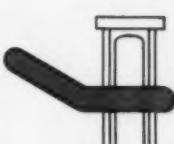
...world's finest trencher crawlers

...all operations controlled at operator's seat

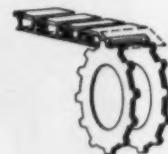
V CONVEYOR ... provides maximum clearance under digging wheel rims ... allows higher heaped loads without clogging ... provides constant elevating angle for faster, higher spoil discharge ... reduces rolling and tumbling ... has stronger torsion-free construction ... employs huskier, longer-lived bearings.

AUTOMATIC CONVEYOR SHIFT ... operator controls hydraulic shifting and positioning of conveyor...digs past poles, trees, shrubs...places spoil where needed ... *all* without leaving seat, without interrupting other operations.

DUAL INDEPENDENT CONVEYOR DRIVE ... identical, self-contained hydraulic motor and planetary gear drives in each head-pulley eliminate *all* conveyor chains and sprockets...reduce belt slippage and wear...furnish operator fingertip control of conveyor belt direction and speed (215-1,000 fpm) independent of all other operations.



FINEST CRAWLERS ON ANY TRENCHER ... employ double flanged wheels, rollers and sprockets with wide-spaced teeth...drives on each end of 1½" dia. hardened pins ... completely eliminates pockets for dirt, stones, etc. ... eliminates take-up devices ... gives greater track stability ... lengthens wear life ... sprockets, wheels and idlers ride on sealed ball or roller bearings requiring only 200-hour lubrication ... a tremendously long-lived, trouble-free, easy-rolling crawler track.



BIG 16" x 3" HYDRAULIC STEERING BRAKES ...controlled by suspended-type foot-pedals... provide simple easy steering and maneuvering.



HYDRAULIC CRUMBING SHOE ... now, crumbing shoe advantages (cleaning, grading) are practical even in crowded digging ... Cleveland's hydraulic shoe control (optional, extra) pivots shoe back and up to allow setting wheel to required depth at walks, drives, underground obstructions, etc.

Engine, Hoist, Wheel, Shoe, Conveyor Speed—Direction—Shift, Crawlers

...Every Operation Controlled at Operator's Seat.

Good



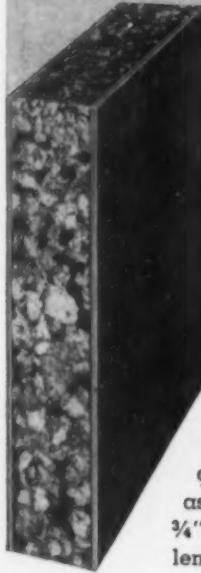
The CLEVELAND TRENCHER Co.

Everywhere

Pioneers of the Modern Trencher

20100 St. Clair Avenue
Cleveland 17, Ohio

5 reasons for specifying AND USING SERVICISED. **KORK-PAK** premolded joint filler



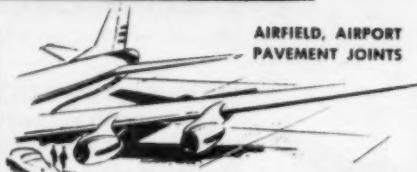
1. Non-extruding
2. Recovers more than 80% of original thickness after compression
3. Low moisture absorption
4. Readily handled without breakage
5. Least expensive non-extruding type

KORK-PAK—an exclusive Servicised development—is composed of cork granules bonded together with asphalt between two sheets of heavy asphalt saturated paper. Available in $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1" thicknesses, widths to 36", and standard lengths of 5 or 10 feet. Longer lengths supplied on special order.

TYPICAL APPLICATIONS



KORK-PAK is widely used in concrete highway expansion joints because of its resiliency, non-extruding and low moisture absorption qualities.



Airport and airfield concrete paving expansion joints filled with KORK-PAK and sealed with Zero-Lastic JF, require little or no maintenance.



KORK-PAK is ideal for use on concrete flooring joints and building construction because of its high compressibility without extrusion factor, and its insulating value.



SERVICISED PRODUCTS CORPORATION

6051 WEST 65TH STREET • CHICAGO 36, ILLINOIS

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Meetings

AMERICAN SOCIETY OF CIVIL ENGINEERS—Winter Meeting, Statler-Hilton Hotel, Los Angeles, Calif., February 9-13.

URBAN TRANSPORTATION CONFERENCE—Michigan State University, with co-operation of National Committee on Urban Transportation and others, East Lansing, Mich.; February 18-20.

45TH ILLINOIS HIGHWAY ENGINEERING CONFERENCE—University of Illinois, Urbana; February 24-26.

UTAH 20TH ANNUAL HIGHWAY CONFERENCE—University of Utah, Civil Engineering Department, Salt Lake City; March 3-4.

EARTHMOVING INDUSTRY CONFERENCE—Society of Automotive Engineers, Central Illinois Section, Peoria, Ill.; April 14-15.

FREEWAY OPERATIONS SEMINARS, Institute of Traffic Engineers (regional series); Moraine Hotel, Highland Park, Ill.; April 15-17; and Town House Motel, Omaha, Nebr.; April 20-22.

AMERICAN CONCRETE INSTITUTE—Annual Convention, Statler Hilton Hotel, Los Angeles, Calif.; February 23-26, 1959.

ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES; annual convention, Hotel Traymore, Atlantic City, N. J.—March 18-20, 1959.

Slip-Form Paver Movie

"Low Cost Concrete Highways with the Slip-Form Paver" film was premiered in Washington, D. C., by the Portland Cement Association before members of the U. S. Bureau of Public Roads with H. A. Radzikowski, Chief of the Bureau's Development Division, presiding.

The 16 mm film, 12 minutes in sound and color, shows how concrete pavement is placed with the latest model of slip-form paver. It includes the various methods of fine grading operations, as well as mixer operations for shoulders and roadbeds where shoulder widths will not permit use of the mixer.

The film is available on a free-loan basis through all PCA district offices or headquarters in Chicago.

- The emergency "D" program scoreboard for the April-December period: 2,689 miles of construction completed including 80 bridges, at \$59.4 million, with 8,394 miles of jobs in progress.

**"You'll get there
faster, cheaper with
BMCO SPR-13's"**



... says M. B. Killian of Killian-House Company in San Antonio, Texas, who promptly ordered two additional BMCO SPR-13's after field-testing his first purchase on Bexar County's Interstate Highway 35 expressway. "Use of the SPR-13's on this project of seven contracts amounting to \$12,000,000 and involving 2,000,000 cubic yards of flexible base, has enabled us to cut compaction time and costs, and put the project well ahead of schedule," reports Jack House of Killian-House.

It will pay you, too, to investigate BMCO before you invest in any new equipment.

BROWNING MANUFACTURING CO.

P. O. BOX 2707 • SAN ANTONIO, TEXAS • WALnut 3-4331

... for more details circle 288 on enclosed return postal card

4 GREAT NEW ENGINES IN THE

all pur

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(20 TO 1650 H.P. IN ONLY 3

THE GM DIESEL
ALL-PURPOSE
POWER LINE
20 to 1650 H.P.
in only 3 cylinder sizes

SEE YOUR GM DEALER

OR WRITE GM



NEW

"2-53"
20 to 47 H.P.



NEW

"2-71"
33 to 67 H.P.



NEW

"3-53"
38 to 97 H.P.



NEW

"3-71"
51 to 118 H.P.



NEW

"4-53"
51 to 130 H.P.



"4-71"
69 to 167 H.P.



NEW

"6V-53"
76 to 195 H.P.



"6-71"
112 to 252 H.P.

pose

wer

line
CYLINDER SIZES)

The Series 53 "Jimmy" Diesels

NEW FOR THE CONSTRUCTION INDUSTRY

Smaller and more compact 2-, 3-, 4-, and V-6 cylinder engines based upon the dependable GM Series 71 Diesel

New as tomorrow is the power concept which GM Diesel has embodied in its All-Purpose Power Line to make you more money on every contract.

Using only 3 cylinder sizes, GM Diesel engineers have more than doubled the number of basic engines—vastly increased the power range—yet maintained the famous GM Diesel family relationship and parts interchangeability.

This concept is dramatically illustrated in the Series 53 "Jimmy" Diesel. For *only* in these Diesels are combined *all* the profit-making, cost-saving advantages *any* Diesel has ever had.

Compare them horsepower for horsepower:

They cost less, weigh less, take up less room. Accelerate faster, last longer, and parts cost less. They're easier and less expensive to repair and maintain—far more efficient, too.

This Series 53 "Jimmy" Diesel is *literally* All-Purpose Power in the 20- to 195-H.P. range. Consider it for your needs. Write GM Diesel, Dept. C-2, Detroit 28, Michigan, and see what these new Series 53 "Jimmy" Diesels can mean to your construction profits.



In Canada:
GENERAL MOTORS
DIESEL, LIMITED,
London, Ontario
Parts and Service
Worldwide



NEW
"6V-71"
112 to 232 H.P.



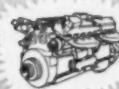
NEW
"BV-71"
150 to 334 H.P.



"6-110"
160 to 335 H.P.



"12V-71"
224 to 304 H.P.



NEW
"16V-71"
300 to 675 H.P.



NEW
"24V-71" (Twin 12)
448 to 1008 H.P.



NEW
"32V-71" (Twin 16)
600 to 1350 H.P.
(Turbocharged—1650 H.P.)

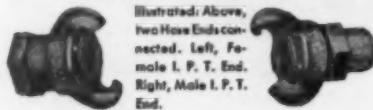
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"AIR KING" Quick-Acting Universal HOSE COUPLING

**FOR COMPRESSORS, ALL TYPES
OF AIR TOOLS, WATER, OIL
AND SPRAY SERVICE**

This versatile coupling is built along plain, rugged lines to assure long, trouble-free service under severest working conditions.



The "Air King" will reduce operating costs wherever quick connections are required. Locking heads are identical for all sizes of hose or threaded ends, permitting the coupling of any two sizes of hose within the "Air King" hose end size range, or coupling to any pipe up to 1" by use of the male or female threaded ends. Heads are locked by pressing together and applying a quarter-turn. A patented Safety Locking Device eliminates all risk of the coupling coming apart. Available in bronze or rustproofed malleable iron, in sizes up to 1".

The "Air King" is made to established standards for couplings of this type and is interchangeable with other similar makes.

Also available in 4-Lug style, Hose and Female I.P.T. Ends only, in 1½", 1¾" and 2" sizes.

DIXON
Valve & Coupling Co.
EXPORT DEPARTMENT
1010 SCHAFF BLDG.
PHILADELPHIA 2, PA., U.S.A.

... for more details circle 306 on enclosed return postal card

New Publications

Urban Highway Research

A bulletin entitled "Urban Research In Highway Planning" has been published by the Highway Research Board. Price \$0.80 remitted to the Board at 2101 Constitution Avenue, Washington, D. C.

The Bulletin contains five papers presented at the 37th Annual Meeting of the Board: "Planning and Research Implications of the Washington Transportation Study," by Paul C. Watt; "Regional Research and Highway Planning," by Harvey S. Perloff (discusses growing pool of knowledge and analytical techniques which have potential value for highway planning); "Urban Arterial Developments Which Benefit the Community," by Earl Andrews (on principles adopted by the New York State Council of Parks); and "Visual Approach to Highway Planning and Design" by Louis B. Wetmore.

Welding and Cutting; (E) Flammable Gases and Liquids, Handling and Storage of Materials and Equipment Upkeep; (F) Excavation and Shoring, Barricades and Pipelines; (G) Pile Driving and Marine Equipment; (H) Concrete Construction, Masonry and Steel Erection; (I) Hoists, Cranes and Derricks; (K) Highway Construction; (L) Heavy Equipment, Motor Trucks, Garages and Repair Shops; (M) Tunnels and Compressed Air Work; (O) Inspection Check List; (R) Introduction.

These booklets may be purchased individually or in quantities at the following prices: 15 cents per single copy, \$1.20 per dozen and \$9 per hundred.

The prices of the complete manual for single copies and in bulk quantity are as follows: \$3.75 per single copy, \$41 per dozen and \$320 per hundred. These prices include handling and shipping charges. Address Associated General Contractors of America, Inc., 20th and E Streets, N.W., Washington 6, D. C.

Solving Drainage Problems

Manufacturers of corrugated steel riveted culvert pipe, as well as designers, engineers and others who must plan and execute installations where drainage and loading problems are encountered, will be interested in and find useful the second edition of Bethlehem Steel Company's booklet, "Solving Drainage Problems."

To be had free by writing to Bethlehem's Publications Department, Bethlehem, Pa., this 76-page illustrated brochure contains descriptive information, charts and data, new tables for the evaluation of flow friction that will greatly simplify planning and design under most conceivable conditions.

Bethlehem Steel is not a fabricator of culvert pipe but producer of a special copper-bearing steel—Beth-Cu-Loy—used for corrugated culvert service. The booklet discusses the structural and economic advantages of corrugated sheet steel in the manufacture and installation of drainage culverts.

ASTM STANDARDS ON MINERAL AGGREGATES AND CONCRETE C-9-D4; 384 pages, paper cover, 6 x 9", \$4.75. American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

This compilation sponsored by

(Continued on page 45)

GMC

goes "full speed ahead" with

OPERATION "HIGH GEAR"

GMC pours on the power in the biggest engineering, design and quality-control program the industry has ever known... bringing you trucks unmatched for their rugged reliability and economical performance!

The biggest things in trucks today are happening at GMC!

Without fanfare, GMC has embarked on a giant engineering, design and quality-control program... Operation "High Gear".

You sense its impact everywhere you turn.

You find it in the alertness and feeling of pride all along the assembly line... and in the close teamplay between engineering, manufacturing, sales and service.

You see it in the great new choice of GMC trucks... the complete selection of pickups, six-wheelers, tractors, dumps—in fact, a size

and type for your every construction need.

You discover it in every truck built by GMC... in the extra-rugged *all-truck* quality that spells new reliability and long life... in the advances in engines, transmissions, axles and frames that mean new operating economies.

The biggest forward surge of its kind in trucking history, Operation "High Gear" is backed by the keenest brains and manufacturing know-how in the business. And, it's gaining speed with every passing day! GMC Truck & Coach—a General Motors Division.

Turn the page and see how Operation "High Gear" can pay off for you!





Light-duty GMC's are truck-built, too! A quick comparison will convince you there's no pickup for rugged construction work like GMC! Test the tailgate with one end unhooked. Two men can't make it sag. Check the front crossmember — same as on bigger GMC's. Note GMC's big-displacement *truck* engine.



Rugged reinforced frames give GMC's backbone! GMC frames are built with extra brawn to withstand the shocks, twisting and stresses of heavy hauling over rough terrain. Where required, heat-treated frames and strategic reinforcing are used to give added strength without extra weight.

GMC OPERATION “HIGH GEAR”

brings you the world's most advanced trucks for on- and off-road construction . . . from truck-built $\frac{1}{2}$ -ton pickups to giant 90,000 GCW workhorses!

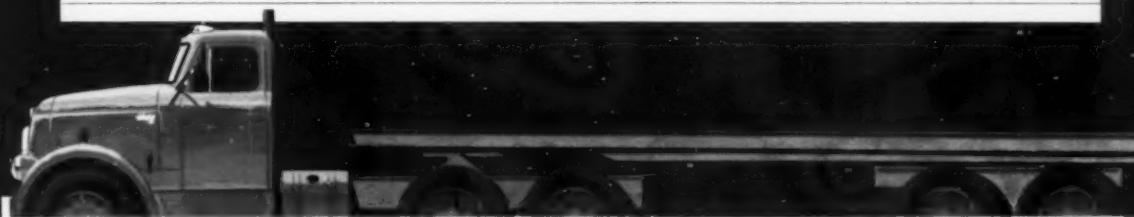
ECONOMICAL DIESEL POWER FOR ANY CONSTRUCTION JOB!

ENGINE MODEL

GMC 4-71

GMC 6-71SE*

Gross HP at RPM	152 at 2300	189 at 1800	210 at 2100
Net HP at RPM	136 at 2300	175 at 1800	192 at 2100
Gross Torque at RPM	374 at 15-1600	577 at 1200	577 at 1200
Net Torque at RPM	344 at 13-1500	553 at 1200	553 at 1200



* Two power outputs shown reflect governor settings. Also available on request, full-power 6-71 developing 235 H.P.

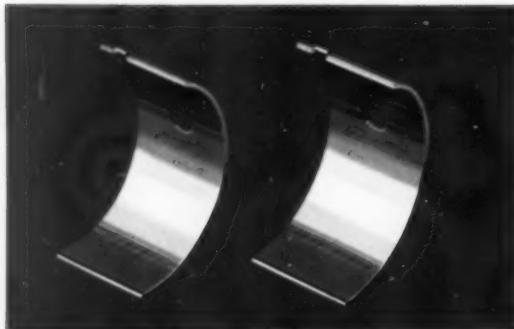
GMC Two-Cycle Diesels combine power and economy.

GMC 4- or 6-cylinder diesels are *two-cycle* engines. They pack more power per cubic inch and more power per pound of engine weight, at lower RPM's. *Four* exhaust valves per

cylinder (not just one or two) plus GMC's precision fuel injectors give greater economy and efficiency. And, remember, in a GMC both engine and power train are *tailor-made for each other!*



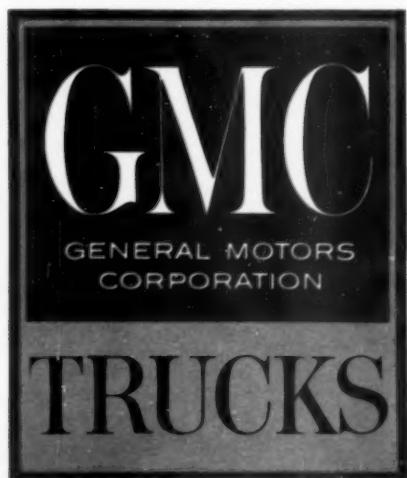
Synchromesh transmissions standard on all construction trucks! No double-clutching, grinding gears or extra cost with synchromesh. GMC's smooth Hydraulic transmission and new Torqmatic automatic transmission with built-in hydraulic retarder for heavier trucks —available at extra cost.



Extra quality makes GMC engines last! M-400 bearings with 7 times the wear of conventional bearings . . . drilled oil passages in connecting rods . . . only two of more than 40 extra quality features standard on GMC's!

BIGGEST CHOICE OF CHASSIS AND COMPONENTS IN THE INDUSTRY! You name it, GMC's got it! From the smallest pickup to the largest tractor, GMC can tailor-make the truck to fit your job. From its wide selection of cabs, engines, transmissions, frames, axles and wheels GMC can now offer you practically any truck combination you require — all thoroughly tested and proved for reliability and long life.

From $\frac{1}{2}$ -ton to 45-ton . . .
General Motors leads the way!



Single Motor Grader Serves Big Grading Job

(See Cover Scene)

The varied role of today's heavy-duty motor grader is demonstrated on Wisconsin project, the first of the "I" jobs that will run from the Minnesota state line to the Illinois Toll Road.

Lawrence Gerke, contractor, was awarded a $2\frac{1}{4}$ mile contract for this segment. The Huber-Warco 5D-190 motor grader pictured on the cover has handled all grader assignments. The job entails 1,000,000 cu. yd. of earth and 300,000 cu. yd. of rock. There are eight major cuts, with the maximum 115 ft. and five major fills, the biggest being 70 ft. Three major haul roads are each approximately 1,000 ft. long. The terrain is very hilly, and the material is sandy with considerable clay and soft sandstone.

The main job of the 5D-190 has been to maintain the haul roads and keep the fills dressed. The nine scrapers on medium haul have made this an intensive job. Gerke believes in keeping haul roads really smooth, making it possible for the haul units to travel faster up the steep inclines. Smooth roads are also easier on tires, and with tire costs of \$4,500 each, the elimination of ruts and sharp rocks on the roads mean longer tire life.

To show the size of the fleet for which this single grader has had to play "house mother," the equipment spread in 1958 included 3 Euclid S-18s (18-yd.), 2 Euclid TS-24s (pusher motor, 25-yd.), 3 Euclid 22-ton rear dumps, 6 heavy tractors (International, Allis-Chalmers and Caterpillar), and a Lima 3-yd. shovel.

Since the Huber-Warco is the only grader on the job, it has been used to cut all ditches and dress the slopes after the cuts and fills are completed. It was also scheduled to spread the 9-in. sand lift (granular subbase). After all paving is completed in 1959, the grader will spread top soil over the excavated areas before the grass is seeded.

Tennessee Seeks New Land Acquisition Law

Tennessee is among the states which are still hampered by inadequate right-of-way acquisition laws, according to a statement by O. L. Peeler, attorney-engineer in the

Tennessee Department of Highways.

"Our State's laws need changing to cut red tape," said Peeler in a recent address before the Tennessee County Services Association. He proposed that the state's "jury of view" be abolished to omit any unnecessary step in land condemnation suits. Mr. Peeler also spoke of the need to pass a public act which would permit zoning bodies of cities and counties to act to prevent development of land on which highways are already planned.

In 99 percent land condemnation suits, Peeler said, either the state or the property owner appeals the finding of a jury of view to a hearing by a jury of 12. He proposed that an amended law provide for appeals from appraisers values to go directly to a jury of twelve.

Present laws on rights-of-way for federal aid highways require first an estimate of the land value by appraisers. If the land cannot be bought at the appraised price, it is condemned.

Portland Cement Association Elects Four New Members

The Portland Cement Association has elected four new member companies, according to president G. Donald Kennedy: Halliburton Portland Cement Co., Saskatchewan Cement Co., Ltd., Northern California Division of Ideal Cement Co., and Oregon Division of Ideal Cement Co. They bring the total membership to 74.

PCA has also announced new field service activities in northern California, through a San Francisco sub-office of its Los Angeles district office. Service in Oregon will be through the Seattle district office.

Announced concurrently is the appointment of Warren G. Burres as district engineer at Los Angeles, succeeding John M. McNerney who becomes western regional manager.

Big Snow Plow Fleet for Illinois Tollway

The 190-mile Illinois Tollway system this winter has 77 trucks assigned to snow removal and deicing.

An initial equipment order totaling over \$200,000 included 27 FWD Clintonville trucks and 50 International Harvester trucks, 13 of which are equipped as 4 x 4's. All trucks have Wausau "B" plows, high speed blade plows or underbody ice blade equipment.



DO YOU KNOW OR ASSUME YOUR EQUIPMENT IS BUSY?

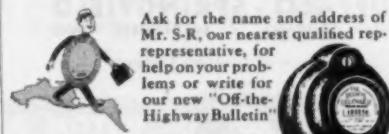
SERVIS RECORDERS TELL YOU AT A GLANCE WHEN IT IS — HOW LONG IT'S IDLE

For every piece of equipment that moves during work, trucks, front-end loaders, ready-mixers, graders, etc., bolt on a tamperproof Servis Recorder and it will accurately chart busy time and all stops or delays.

It writes its own permanent record for daily, weekly or for 3 day periods.

You can put your finger on costly delays or overtime and determine the cause from this unquestioned record.

Proven by over-the-highway haulers and industry for 46 years, low-cost Servis Recorders are ready now to help you increase productivity and profits.



THE SERVICE RECORDER COMPANY

10132 Rockwell Ave. • Cleveland 14, Ohio

... for more details circle 346 on enclosed return postal card

INTRODUCING..... a NEW development in pneumatic tire rollers

Compacts earth fills and all courses of flexible-type pavements: sub-base, base, surface materials

Variable-weight wheel loads (3340 to 8600 lbs. per wheel) to suit various materials and density requirements

Broadening its line into the field of pneumatic tire compaction equipment, Buffalo-Springfield brings you "years-ahead" features in a big, 7-wheel, self-propelled roller . . . the 10-30 ton PSR-30.

You get positive 4-wheel drive. Twin propeller shafts (one to each pair of drive wheels) transmit power from bevel gear differential to final drive case at wheels. All wheels oscillate for contour compaction. Smooth, infinite speed changes up to 19.4 m.p.h. in either direction are controlled by hydraulic power shifting and full reversing through 3-range transmission, and torque converter. Other features: 4-wheel hydraulic brakes with air booster, power steering, dual controls and swivel seats at both sides . . . and a good view of guide and drive wheels from either operating position!

For more details on this advanced new PSR-30 . . . and other types of compaction equipment . . . your Buffalo-Springfield® distributor is the man to see. Call him today.

BUFFALO - SPRINGFIELD
ROLLER COMPANY • SPRINGFIELD, OHIO

A division of Koehring Company



8908

PNEUMATIC TIRE • VIBRATORY • SEGMENTED ROLLERS • 2 AND 3-AXLE TANDEMS • 3-WHEEL ROLLERS • KOMPACTOR™

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97 TO 98% DENSITY ON ASPHALTIC CONCRETE — A mixture of course and fine mineral aggregates and asphalt cement was placed in 1½" lifts to resurface highway. State specifications of 95% density were met and exceeded by this Buffalo-Springfield PSR-30. It was ballasted to a total weight of 42,000 lbs. (6,000-lb. load on each wheel) — and supplemented "break-down" and "finish" rolling on this job.



COMPACTING BANK-RUN GRAVEL — All courses of classified materials for flexible-type pavement were compacted by this PSR-30, ballasted to 36,000 lbs. (6,000-lbs. per wheel). Courses consisted of: 2 layers of sub-base bank-run gravel, compacted to 9" . . . 8" waterbound macadam base course, in 2 lifts . . . a 3" bituminous macadam base course . . . 2½" asphaltic concrete base course, and finally a 1½" asphaltic concrete surface course.

ROADS AND STREETS, February, 1959

New Publications

(Continued from page 38)

ASTM Committee C-9 on Concrete and Concrete Aggregates and Committee D-4 on Road and Paving Materials includes all of the standards prepared by Committee C-9, but only those for aggregates and other selected highway materials developed by D-4. In addition it contains pertinent specifications for cement (under Committee C-1 on Cement).

The book contains 101 standard specifications, methods of test, recommended practices and definitions of terms for mineral aggregates, concrete, concrete curing materials, expansion joint fillers, and miscellaneous related specifications. References are given for specifications on concrete reinforcing steel, paving block and brick, and bituminous and non-bituminous road materials. Of the included standards 46 are new or revised since the 1956 edition, which is superseded.

THE ALKALI-AGGREGATE REACTION IN CONCRETE; (Research Report 18-C) Highway Research Board, 2101 Constitution Avenue, Washington, D. C. Price \$1.00.

In 1940 it was first reported that the cause of deterioration of certain concretes was an expansive reaction between the alkalies in the cement and certain constituents of the aggregate. Since that time there have been many reports—often contradictory—relating to this problem. This report covers a discussion of the problem sponsored by the Highway Research Board Committee on Durability of Concrete—Chemical Aspects.

ADMINISTRATIVE STRUCTURE OF LOCAL RURAL ROAD ORGANIZATIONS. Special report 37, the Highway Research Board. Price \$1.20 remitted to the Board, at 2101 Constitution Avenue, Washington, D. C.

REINFORCED CONCRETE FUNDAMENTALS. By Phil M. Ferguson, Professor of Civil Engineering, University of Texas. Published by John Wiley & Sons, 440 Fourth Avenue, New York 16, N. Y. 604 Pages. Price: \$9.50.

This next text and general reference emphasizes the ultimate strength theory and manner in which beams and members fail

under overload. Data are included on experimental and research background, design methods, interpretation of the ACI Building Code and other chapters.

HYDROLOGY FOR ENGINEERS. By Ray K. Linsley, Jr., Max A. Kohler and Joseph L. H. Paulhus. McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. Price \$8.00.

Published in the McGraw-Hill Civil Engineering Series, this 316-

page illustrated text and manual presents the background theory and the specific techniques of the field, limiting its scope to intensive treatment of the portions of hydrology which concern the engineer.

LEGAL ASPECTS OF CONSTRUCTION. By Walter C. Sadler, Engineering and Legal Consultant. 400 pages, 6 x 9, 76 illustrations. Price: \$8.50. McGraw-Hill Book Co., Inc., 327 West 41st Street, New York 36, N. Y.

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This year of 1959 is the Golden Anniversary of Wisconsin Engines. It heralds 50 years of continuous engine progress. Fifty years of engineering development and exclusive specialization in the design and manufacture of engines.

- Originally manufactured in a power range up to 200 hp., Wisconsin Engines helped to make automotive history as well as supplying dependable power for many industrial applications—service that called for the most advanced engineering.
- Heavy-duty design and construction and High Torque performance have been traditional features of all Wisconsin Engines. You get longer life from Wisconsin Engines and lowest cost maintenance.
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These models provide maximum stability for long, high speed hauls. They have capacities of 12, 18, and 24 yds. struck... are powered by engines of 218 to 335 h.p. and haul heaped loads of 16, 25 and 32 yds. at speeds up to 30 mph. These scraper bowls are interchangeable with bottom-dumps of 13, 17 and 25 yd. capacities.



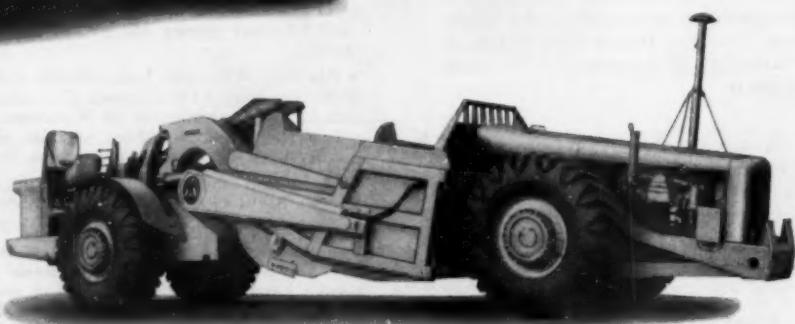
OVER-HUNG ENGINE MODELS

Payload capacities of these "Eucs" are 7, 12 and 21 yds. struck... 9, 17 and 30 yds. heaped. Over-hung engine design of tractors provides excellent maneuverability and ease of handling in difficult work... engines are 143, 218 and 325 h.p. Rear-Dump trailers of 12, 22 and 35 ton capacities are interchangeable with the scrapers.



TWIN-POWER SCRAPER

With a total of 518 h.p., this Euclid has a struck capacity of 24 yds... 32 yds. heaped. Two engines, each having a separate Torqmatic Drive, enable this "Euc" to work independent of other equipment and move more yards at lowest cost on any scraper job.



Your Euclid dealer can supply performance and cost data on the Euclid Scrapers best suited to your operations. Have him show you why Euclids give you the best return on investment.



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FOR MOVING EARTH, ROCK, COAL AND ORE

size or kind of job

7 MODELS

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S-7

Model S-7 is equipped with 143 h.p. engine...18.00 x 25 tires...4-speed Torqmatic Drive...full hydraulic 90° steering. Capacity is 7 cu. yds. struck and 9 yds. heaped at 1:1 slope. Optional tires are 21.00 x 25.



S-12

Powered by a 218 h.p. engine, the Euclid S-12 Scraper has a 5-speed transmission...24.00 x 25 tires...full hydraulic 90° steering. Struck capacity is 12 cu.yds....at 1:1 heap, 17 yds.



S-18

This Model S-18 has a 325 h.p. engine with 4-speed Torqmatic Drive and converter lock-up. Struck capacity is 21 cu. yds....30 yds. at 1:1 heap. Tires are 27.00 x 33 with 33.5 x 33 optional...full hydraulic 90° steering.

EUCLID
Division of General Motors Corporation
Cleveland 17, Ohio

TS-24



The Model TS-24 has a 300 h.p. engine for the tractor and a 218 h.p. engine for the scraper...each with a separate Torqmatic Drive. Heaped capacity at 1:1 is 32 cu. yds....24 yds. struck. Full 90° hydraulic steering...27.00 x 33 tires with 33.5 x 33 optional.

SS-12

This 4-wheel tractor model has a struck capacity of 12 cu. yds....17 yds. heaped...with 218 h.p. engine and 5-speed transmission. Tire sizes are 12.00 x 25 front and 21.00 x 25 on drive and scraper wheels with 24.00 x 25 optional.



SS-18

The Model SS-18 has a 300 or 320 h.p. engine and 3-speed Torqmatic Drive or a standard 10-speed transmission. Capacity is 18 cu. yds. struck and 25 yds. heaped. Drive and scraper tires are 24.00 x 25 with 29.5 x 25 optional...hydraulic booster steering.



SS-24

A 325 or 335 h.p. engine with Allison 4-speed transmission and converter lock-up powers the Model SS-24. Struck capacity is 24 cu. yds....32 yds. heaped. Drive and scraper tires are 27.00 x 33 with 33.5 x 33 optional for maximum traction and flotation.

"Euc" Scrapers have hydraulic lever action, 4 section adjustable and reversible cutting edges, unequalled accessibility for servicing and other cost-cutting advantages. Check job performance and return on investment before you decide on any scraper equipment.

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(Left): Loader used to drag bundles of reinforcing steel from unloading point to various work areas along Vine Street expressway, Philadelphia. (Right): The same loader toting a compressor to a different part of the job. On its return trip (not pictured here) it carried six men in the bucket, who were being moved to a different location.

Loader was "Busy Kid" On Municipal Job

Pictures show a few minutes in a busy day for the operator of a Hough loader, on the Vine Street Expressway project of Lipsett Inc.,

skirting downtown Philadelphia.

This loader's primary job was to shuttle up and down this multi-million dollar project to do clean-up work. When it wasn't loading dabs of material into truck, pushing rubbish into piles to clear traffic paths,

giving equipment an assist on soft grades, etc., etc., it turned to several unusual chores.

One here consisted of dragging bundles of heavy reinforcing steel required for the underpass structures for Vine Street Expressway.

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12 of a fleet of 25 trucks equipped with
DAYBROOK SERIES 1030 DUMP BODIES
DAYBROOK SERIES 7B132 Speedlift HOISTS
for FAST HEAVY DUTY HAULING

DAYBROOK Team Work PAYS OFF! One truck or a fleet . . . when you "team-up" dependable Daybrook Steel or Aluminum Dump Bodies with Daybrook underbody or Telescopic Hoists you have "one" responsibility . . . all Daybrook.

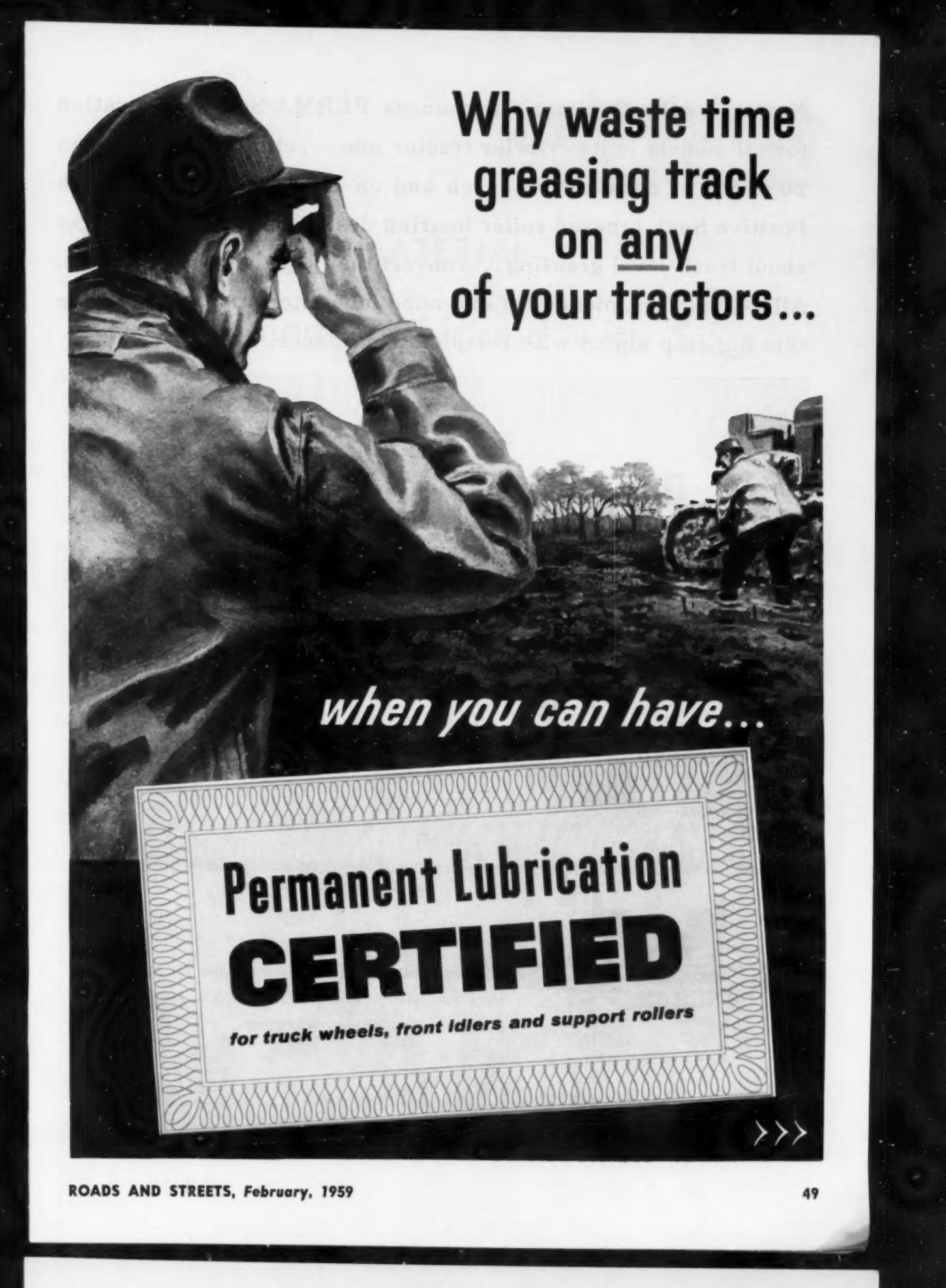
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- DUMP BODY BROADSIDE—17 series bodies for light, medium and heavy duty
- HOIST BROADSIDE—12 series conventional direct and arm lift type hoists
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Speedlift®
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Why waste time
greasing track
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when you can have...

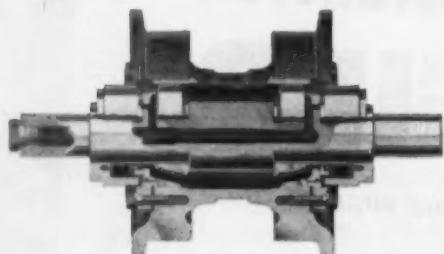
Permanent Lubrication
CERTIFIED

for truck wheels, front idlers and support rollers

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Now . . . Allis-Chalmers announces PERMA-SAFE lubrication for all models in its crawler tractor line . . . climaxing more than 20 years of constant research and on-the-job experience with Positive Seal, tapered roller bearing design. Now you can forget about track-level greasing . . . convert that lost time to profit time. Allis-Chalmers, pioneer of extended lube intervals, lets you take this big step ahead with complete confidence.

The advertisement features a decorative border composed of a repeating pattern of stylized, wavy lines. Inside this border is a rectangular banner with a decorative scalloped edge. The banner contains the text "Permanent Lubrication" on the top line and "CERTIFIED" on the bottom line, both in large, bold, sans-serif capital letters. Below this banner is a circular seal with a serrated outer edge. The seal contains the text "The Positive Seal" at the top, "AC" in a diamond logo in the center, "PERMA-SAFE" in the middle, and "Wheel" at the bottom. To the right of the seal, the text "for truck wheels, front idlers and support rollers on all models of Allis-Chalmers crawler tractors" is written in a smaller, italicized font.



See your nearby Allis-Chalmers dealer for the full story now. Allis-Chalmers Construction Machinery Division, Milwaukee 1, Wisconsin.

move ahead with **ALLIS-CHALMERS**

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ROADS AND STREETS

"ALL WEATHER" MATERIAL—

Grading an Airfield with Slag

Blast furnace slag made excellent fill at Olmsted Air Force Base—it put C. J. Langenfelder & Sons, Inc. months ahead. But the abrasive material was tough on equipment and required special specifications and test procedures for compaction . . . Aspects for \$12½ million project designed by Baltimore Engineer District

Roads and Streets Staff Report

ONE OF THE largest single project uses ever made of slag as an engineering material occurred during 1957 and 1958 just east of Harrisburg, Pennsylvania. Here at Olmsted Air Force Base over 4.7 million cubic yards of blast furnace slag borrow was placed, in an operation which stole new ground from the Susquehanna River channel to revamp a wartime airfield for modern military needs.

Slag played more than an engineering role. It was a delay-saver for Langenfelder. This Baltimore contractor won the job by a narrow bid margin from a field of ten big-name firms, based on his decision to use mountains of nearby slag, specified by the Army as an alternate. The Corps of Engineers

had previously determined that the steel mill's by-product would (1) make acceptable fill, subbase and base, (2) be placeable in almost any weather, and (3) support hauling equipment during winter and spring months when ordinary dirt grading would be impossible.

While Bethlehem Steel Co. was glad to have its waste removed, Army Engineers were assured of excellent quality embankment construction—although not without some preliminary problems in devising effective rolling and testing control.

The project, now nearing completion, is designed for equipping Olmsted as an area headquarters for the Air Materiel Command's plane overhauling service. Two wartime runways have given way to a new heavy concrete pavement system com-

- Built-up Euclid bottom dumps (in foreground) lined up to dump slag at water's edge for Olmsted project.





● Slag loading at peak of filling job at Olmsted—Marion 4-yd. shovel, with Esco bucket loading a Cat DW20 drawn Athey bottom dump.



● Note heavily hardfaced bucket sides—done to reduce abrasive action of the slag.



● Early stage of filling, with platform being carried progressively toward far closure point.

● Beginning core wall construction—dragline trenching through slag fill to rock and dozer filling with impervious material following close behind.



prising a 200 x 10,000 ft. runway, related taxiways, apron and warm-up pads totaling 582,000 sq. yd. of heavy-duty concrete including extensive overlay.

The field enlargement necessitated extending new land about 1,000 ft. out into the existing river channel, with 30 ft. maximum filling. A levee some 12,000 ft. long rims the made land.

The six million cubic yards of filling and base preparation included 600,000 cu. yd. of unclassified and rock hill removal; 212,000 cu. yd. of earth borrow and blanketing over the slag fill; and 276,000 cu. yd. of impervious material for the levee core wall. The rest—over 4,700,000 cu. yd. in all—was slag of various specification grades.

Langenfelder was awarded the job in November of 1956, and during the first winter completed clearing and grubbing and began improving haul roads from the slag pits. Scraper and rock work for the unclassified excavation was routinely handled.

Slag hauling began in January of 1957. Thanks to the "all-weather" quality of the material slag transport and placement continued in all seasons through the next 17 months, with such steadiness that by June, 1958, the job was 100 percent ahead of schedule—60 percent done instead of 30 percent. Delays in hauling in that time didn't exceed two weeks; the only serious job stoppage was due to a river flood which covered the haul roads.

● Loading and Hauling. The slag placement was carried on at a maintained rate of about 17,000 cu. yd. per 20-hour day, with peak days up to 20,000 cu. yd. Three slag pits were worked, averaging about 3.5 miles one-way haul with the farthest pit 5 miles. All hauling was over a private haul road surfaced with densely compacted slag, and kept under constant blade and sprinkler maintenance.

Shovel equipment included a Lima 6-yd., Marion 4-yd. and two Northwest 80D shovels the other pits.

Hauling was done with 7 Athey Model . . . 35-yd. bottom dumps, built up to carry 40 to 50 cu. yd. per load; and 13 Euclid bottom-dumps also sideboarded for 34-yd. hauls. Several rear-dumps also were used at times. The sideboards for bottom-dumps were considered necessary for maximum hauling economy because of the light weight of the slag—80 to 85 lb. loose (87 to 95 lb. compacted).

● River Filling. A dry platform was provided by filling in the river until the slag rose 18 to 24 in. above the normal river elevation. The platform



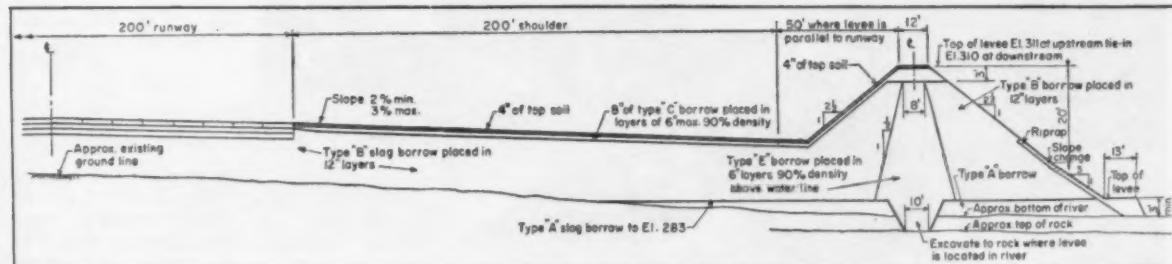
● A third shovel used for a time in loading slag was this Lima 6-yd.

was started at one end and extended progressively through the two-mile-long fill area to the other end, using dozers to push the dumped material into the water. For this lower filling, specification Type A slag was used, consisting of 15 in. maximum size material. This material was required to be so graded that in-place samples contained no more than 15 percent passing the No. 10 sieve.

No rolling was required until the fill reached elevation 282 just above river level. The top 12 in. lift of Type A material, up to Elev. 283, was rolled with a heavy rubber-tired roller, and required to be reasonably dense and uniform, without segregation incurred in the dozer spreading.

A total of 420,000 cu. yd. of Type A slag was thus placed, chiefly in the made-land area. Its boundary was controlled to conform with the outer toe of the 12,000 ft. levee.

● Levee Construction. The new levee of course had to be completed before the old levee to the rear could be removed, so that the airfield would have flood protection at all times. After filling the platform to Elev. 283, a trench was cut to bedrock along the levee centerline, working with backhoe and dragline from one end through to the other. This trench having 10 ft. bottom width was back-filled with impervious material, specification Type E, the filling progressing



● Cross section scheme for the river-side fill and new dike at Olmsted Air Force Base.



● Good aerial view of fill nearing completion and core wall (light colored material) being carried up simultaneously.

not more than 500 ft. behind the trenching.

The Type E core wall material was a bank-run borrow. The controlling specifications were, Liquid Limit of not over 40, Plasticity Index not over 15 for the minus 40 fraction, with not less than 15 percent of the material passing the 200 mesh sieve.

When the core wall had been filled in to Elev. 283 for the entire length, the core wall and the fill were then brought up the remainder of the height simultaneously. Type E material in the core wall was placed in 6 in. lifts and rolled as soon as sufficiently above water to take rolling equipment. Various kinds of rollers were employed including sheepfoot, large rubber-tired, and a Buffalo-Springfield Kompactor to secure the specified 90 per cent modified AASHO density.

The core wall was carried to the top of the levee, which ranged from Elev. 310 to 311 along the river gradient. The outer side of the core was blanketed with slag and portions were given a stone riprap cover. The inner slope was covered with Type C earth seal, topsoiled and seeded.



● A Buffalo-Springfield Kompactor, left, helped consolidate core material and earth embankment areas. Near end of job, sideboard frames above, were lifted from the Euclids and stored for removal.

● Another pit loading —P & H shovel at left, Marion at right, loading Athey's with Cat D7 shoving slag toward shovel.

At the same time, for the fill above Elev. 283, Type B slag (8 in. max.) totaling 3,900,000 cu. yd. was placed as the main slag filling effort. Rolling was done with a 50 to 60 ton rubber-tired compactor weighing at least 25,000 lb. per wheel with 90 psi tire pressure. At least four complete coverages (eight passes) were required.

Dry density and gradation tests were run with $\frac{1}{4}$ cu. ft. samples taken from each lift. Although degradation occurred under rolling, there was no serious problem in meeting the fines limitation. In anticipation of size reduction, the Type B specification permitted not more than 10 percent passing the No. 4 before rolling—as compared with a maximum of 50 percent passing No. 4 after compaction, as determined from in-place samples.

Throughout the placement of all slag types in the job, the contractor found it expedient to remove iron-rich nuggets by hand. These were picked up with a front loader and removed by rear dump or truck. These chunks proved to be a valuable source of revenue.

- **Subbase.** The 30-in. subbase and 12 in. base courses under pavement areas—42 in. combined—were also built with slag specification Type D as a permissible alternate. The minus 200 portion of this 4 in. maximum material was required to fall in the range of 5 to 20 percent as tested after rolling.

Early in the project, it became evident that density could not be related to roller passes with this material, and hence could not be used as a means of determining acceptance. It was found that four coverages with the specified 60 ton rubber-tired roller (30,000 lb. per



● Glimpse of Langenfelder's private 2-lane slag-surfaced haul road and bridge over state road. This road provided a stable haul path in all seasons, with help of intensive maintenance.

wheel with 150 psi) would produce a marked increase in the dry density, but that little additional density showed up in eight additional coverages. The extremely flat curves of the relationship made difficulty.

Two test embankments were built, and a special investigation of the rolling and densifying characteristics of the slag was carried out. Only the specified size and type of roller was used throughout this testing. The data thus taken showed that special control pro-

cedures would be necessary. Analysis of test results was thereafter taken over by the field laboratory, with assistance from the Corps of Engineers district laboratory at Baltimore. Unit weight tests were made with $\frac{1}{4}$ cu. ft. samples, and these samples were correlated with coverage requirements.

As a result it was decided to roll the first six 6-in. subbase and base lifts with 8 roller coverages (16 passes) per lift, and the last lift with 12 coverages (24 passes). By



● Apron area, slag subbase material being degraded by a Pettibone-Wood Preparer, rolled by a Grace 50-ton rubber-tired roller (Cat D8 drawn), with a Cat 12 grader making final laying out.



• Dike being topped out and outer slope dressed by a Gradall machine.

ued to be a serious matter in the spreading and dumping part of the haul cycle. All off-road tires were Firestones, furnished and serviced by a local dealer.

This project is only one segment of a \$30 million expansion program at Olmsted Air Force Base. Design responsibilities and contract administration and supervision are being handled by the Army's Baltimore District Engineer, Colonel Stanley T. B. Johnson. Rufus E. Greene is resident engineer and William O. Dulling assistant resident engineer in the Corps' organization. Russell E. Strohm is the project manager on the runway improvements for C. J. Langenfelder

Special Compaction Control at Olmsted Required for Slag

Two test embankments and elaborate studies of slag behavior were made during the grading at Olmsted Air Force Base. Working with C. J. Langenfelder & Sons, contractors, the Corps of Engineers reached several noteworthy conclusions for the blast furnace slag utilized in the heavy subbase and base courses.

As enumerated in a report prepared by the Corps of Engineers, Baltimore district, some of the observations and conclusions are—

- The specific gravity of the slag increased during rolling, due to degradation. This resulted in a non-consistent relationship between unit weight of the material and void ratio. Additional rolling tended to

indicate a higher unit weight, without the corresponding change in void ratio.

- Specimens having the highest unit weight had the highest void ratio, contrary to normal expectancy for most materials.

For these and related data from the investigations, it was concluded that the modified AASHO method of test for density was not suitable for the slag materials used. An empirical control method was adopted for compaction of subbase and base courses, consisting of a specified number of passes of a given type and weight of roller. This approach to density control was also employed for the embankment.

using care in pit selection, the contractor was able to allow for degradation under processing and rolling and meet the specification limit on fines. The top lift was limited to 2 in. maximum material.

The 42 in. subbase and base courses, totaling about 500,000 cu. yd., were placed with the help of two Pettibone-Wood Preparizers which processed the material in place to reduce oversize and leave a satisfactory pre-rolling gradation. The procedure was to drop the material with bottom-dumps, spread with a heavy crawler tractor, process with one or two Preparizer passes, turn over and lay out with a motor grader, and roll while making finishing blade passes where

necessary. The Preparizers reportedly handled this husky assignment efficiently to the satisfaction of both the engineers and contractor.

A subgrade modulus (K) of 300 was assumed for embankment areas as the basis for the thickness design of the concrete pavement for medium-heavy military aircraft.

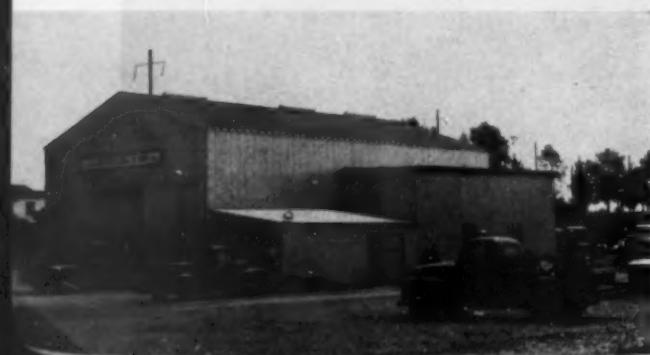
The contractor credits the slag as one of the reasons why hauling was maintained at high efficiency in virtually all weather. The chief complaint was the wear and tear on tires by the rough slag material; blow-outs were above normal until the problem could be brought under control. This adverse factor was minimized by haulway maintenance, although tire cuts contin-

& Sons, Inc.

Editor's Note: In addition to the excellent results reported from past field uses, the benefits of slag for such purposes as covered in this article are indicated by results of triaxial tests on slag, stone, gravel and sand, made several years ago by the Civil Aeronautics Administration. Based on conclusions from these data W. M. Aldous, R. C. Herner and M. H. Price authored CAA Technical Development Report No. 144 June, 1951, in which it is stated: "In load transmission tests of base courses the crushed slag should be the best of the four materials tested triaxially . . ."

It is interesting also to note that similar results have been encountered with granulated blast furnace slag for subbase under concrete pavements. Mr. G. A. Oakes, soils engineer for Richardson, Gordon and Associates in a paper entitled, "The Use of Granulated Slag as Subbase for Pavements" presented at the October 15-19, 1956 ASCE Convention in Pittsburgh described work on the Ohio Turnpike. He reported that standard test procedures were generally not applicable to granulated slag, and from the results of test strips, acceptance was stipulated on the basis of the number of roller passes.

- Langenfelder's spacious field shop, built for this 2-year project.



POPULATION ESTIMATES SHOW WHY THE ROAD PROGRAM MUST KEEP ON EXPANDING

By Harold J. McKeever, Editor-in-Chief

State road building awards spurted during the calendar year just ended (as reported in January Roads and Streets) and this work load was accompanied by a healthy rise in expenditures for road construction put in place. With another 15 percent or higher rise predicted for 1959, and a similar gain in 1960, the federal-aid highway program will have reached its plateau under the federal, state and other fund sources now in sight.

Further rises contemplated by Congress in framing the 13-year Interstate program, will be reached only if Congress acts soon to further liberalize outgo under the Highway Trust Fund.

While the road builders roll up sleeves a notch higher for 1959, let us look at what's ahead—and see if even the intended peak of highway effort under the 1956 and 1958 Federal legislation is good enough. There is mounting evidence this peak actually will be far short, particularly in and around population centers. The 7 billion annual pace we have reached today for all road, street and structure work (*including engineering, administration and rights-of-way*) will need to grow to \$15 billion or more at present prices, if the nation's needs of 1975 are to be met. Should inflation creep further, the figure must be even higher.

• The reason for this need is a simple one: *rising population and continued urban expansion*. One of the most eloquent and factual appraisals of our growth trends was published recently in U.S. News and World Report. Dr. Philip M. Hauser, who heads the Population Research Center, University of Chicago, in an interview told of the population trend in the U.S. which is climbing faster than previously predicted, and is destined to rise even faster as the post-war boom crop of babies reach marriage age. The previous estimate bracket for U.S. population in 1975 was 207 to 216 million. The newest is 216 to 244 million, or 22 to 38 per-

cent greater than today's 175 million.

The concern of the highway planner of course that population means traffic. His concern deepens with Dr. Hauser's further prediction, based on established growth patterns, that virtually all of this growth will take place in urban areas, and the great preponderance of it will be in metropolitan areas.

Still further compounding the problem for individual states is the great disparity in growth rates in sight by 1975. These range from 92 percent population gain in Nevada, 79 percent in Arizona, 57 percent in California, on down. Some of the plains states will lose.

All this population explosion and shift will take place in the design-life period of highway and street facilities now being constructed.

So, once again the eyes are on the planner and the lawmaker. On top of the really magnificent job of planning and financing legislation represented by the Federal Highway Acts of 1956 and 1958, and of the comparable acts of leadership shown by some state legislatures and city governments, the whole effort must be re-analyzed. Sights will have to be raised.

Finding new fund sources will be only part of the task. The public must be aroused again to create a new concern, which in turn will enable congressmen, legislators and councilmen to respond more intelligently.

More urgent than ever is the need for over-all, long-range transportation planning for urban areas. And to make sound planning possible, the time must come soon when "Metro" government—or some other workable means of cutting across horse-and-buggy political jurisdictions in urban areas—will have to be adopted so planning agencies can get down to business swiftly and unhampered.

As 1959 begins, highway and municipal public works people see challenging times ahead. Whatever the job being done now, the public

service rendered will fall short unless population growth patterns and tomorrow's traffic streams are fully anticipated.

Plenty of Steel

This year's outlook for booming road building has few clouds on the horizon, and few bottlenecks once the projects get to the awarding stage. Materials, equipment and contractor capacity generally are equal to any volume of work the highway departments can serve up.

Steel is a noteworthy example of a material which is in good supply today. Whereas three years ago, many designers were turning to other materials for highway bridges because of delivery delays, now the designer can select his types on purely economic basis. Important new capacity has been added to the structural steel producing and fabricating plants.

And structural steel advocates have new competitive weapons in their announced goal of selling a large share of the huge bridge and structure market. As demonstrated at a recent Bethlehem Steel Company conference, fabricators have developed new cost saving shop techniques. Welding in shop and field has made strides. High-strength bolts are a major development rapidly replacing rivets for heavy splices and joints, with a gain in structural efficiency and saving in field labor.

The new plastic analysis methods are helping to utilize higher stress limits with a more accurate knowledge of safety factors. And such big new structural testing and research facilities as the Fritz Engineering Laboratory at Lehigh University, are evolving further refinements in structural design with the help of larger test machines which permit full-size model study.

Bridges are so numerous in the Interstate program that state highway departments and the contractors have a challenging opportunity to help them get mass produced efficiently.



Windrow Sizer, First Step in Securing Uniform Cement Treated Base

(Left): Ko-Cal windrow sizer, towed on the forms by a Cat D8, loosens 4 in. depth of base material and leaves sized windrows. (Below): Rear view of sizer in raised position for inspection.

New Ideas Tried on Difficult



PAVING JOB THROUGH CANYON

Windrow sizer helped get uniformity in cement treated base. Long-wheel-based finishing equipment used for 24-foot-wide placement, new in California. Contractor handicapped by having to pass heavy traffic through job.

A paving job east of Truckee, high up in the California Sierras, commanded considerable attention this past summer. Gordon H. Ball and Company, of Danville, California, paving subcontractor, had to work along a narrow canyon ledge most of the time, and handle heavy traffic through the project in the absence of any possible detour.

This job is a partial relocation and four-laning of U.S. 40 through a precipitous canyon. The section was graded in 1957 by Gibbons and Reed, Inc., of Salt Lake City, the prime contractors. The unprecedented problem of handling very heavy traffic through the grading work in the absence of a detour route, was described in a previous report.*

Gordon H. Ball's organization came on the scene as soon as the late spring in this mile-high altitude location would permit. At first

many bugs had to be worked out of the construction procedures. Equipment breakdowns and weather gave considerable trouble in the beginning. Paving was in full swing however by early June, and the entire 32,400 cu. yd. of 8-in. concrete will be completed in July.

This project was an experiment in paving two lanes, 24 ft. wide, in a single operation, a practice which California has only recently considered for adoption. The state engineers feel that perfecting of this operation will mean the placing of new roadways in service in much less time than formerly, when pours were required in 12 or 13 ft. lanes.

California's usual 4 in. depth of cement-treated base course was specified under the concrete slab in addition to 12 in. of untreated crushed rock. Cement treatment was provided to prevent pumping of soil fines through the joints. The following procedure was used for this project.

For the combined 16 in. depth of

subbase and base, Gibbons and Reed placed and rolled 1½ in. max. crushed material to the blue top stakes of the fill grade line. Gordon H. Ball used these same blue tops to set forms as the first paving subcontract operation. For this job 9-in. forms were set for the 8 in. in concrete slab, in order to obtain better support for the heavy 24 ft. paving equipment. Form bottoms hence were placed 1 in. below the blue tops. Then 4 in. depth of compacted base material to be cement treated was loosened between the forms. Where traffic used the base, often a sacrifier was employed ahead. The loosened material then was mixed with 2½ percent by weight of type II portland cement and necessary moisture. How the contractor performed this is interesting.

● **Windrow Sizer.** After the forms were placed using a compressed air pin driver, a new unit of equipment was employed called a "windrow sizer." This unit, riding on the forms and pulled by a Cat D8 crawler tractor (usually), dug 3 in. below the bottom of the forms with two sets of scarified teeth arranged in two triangles. The bases of the triangles spanned between the

(Continued on page 63)

See "Contractor and Traffic Took Turns on Freeway Job in the High Sierras," Roads and Streets, May, 1958.

NEW CAT D8 SERIES H TRACTOR

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BULLDOZING: PRODUCTION UP



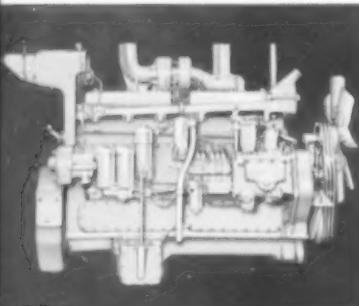
FIELD TESTS PROVE GREATLY

The new Caterpillar D8 Series H Tractor is ready *now* to increase its lead as undisputed king in its size class. A major achievement of Caterpillar's all-out research program, "Project Paydirt," the new D8 has been proved through a rigorous field testing program.

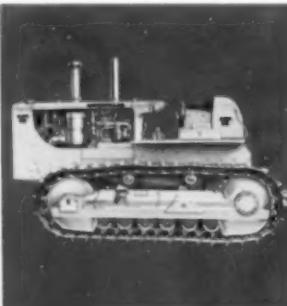
The D8 Series H is new in design, appearance and performance. It is bigger, more powerful. It incor-

porates dramatic new engineering advances. It is easier to operate. It is faster.

On these pages you can see some of the *big* advances the D8 has made. But there are hundreds of other major improvements, too. For example, the transmission, bevel gear and steering clutches have *one* lube system, and it uses SAE 30 engine oil instead of special



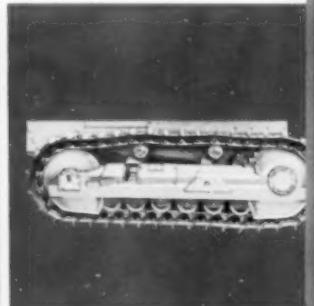
Horsepower increased 18%. The horsepower of the new D8 is up from 191 to 225 at the flywheel, from 155 to 180 at the drawbar. In addition, engine torque rise now is 20%, an increase of one-third. Over-all engine performance has been greatly improved by the addition of a turbocharger.



Size increased. To make effective use of the new horsepower, over-all weight of the tractor has been increased 4,400 lb. to a total of 47,000 lb. At the same time the gauge has been increased to 84 inches, track on ground lengthened to 114 inches, square inches of contact increased to 5,505.



Lifetime lubricated rollers and idlers. That's right — *lifetime!* In a major research breakthrough, Caterpillar has achieved track and carrier rollers and idlers that never require further lubrication until re-building. And service life is hundreds of hours longer than with ordinary rollers.



New, stronger, heavier undercarriage. Every component, such as frames, links, braces, pins, bushings, shoes, has been made stronger by the use of improved materials and heat treat processes to provide longer life. And ground clearance has been increased 50% to almost 20 inches, greatest in the D8 class.

PUSHLOADING: PRODUCTION UP



INCREASED PRODUCTION WITH NEW D8

oils for each. In fact, the D8 is the only tractor in its class to have its entire power train pressure lubricated with completely filtered oil. And there are three brand-new, high-output hydraulic controls for the D8—Nos. 143, 165, 176. The list of improvements is impressive. Add them up, and you can see why the new D8 is the most advanced tractor in its size class.



Dry-type air cleaner. Here's still another major Caterpillar research development on the new D8—the new dry-type cleaner which removes 99.8% of dirt in the intake air, even under severe operating conditions. The new cleaner can be serviced in 5 minutes, costs a good deal less to use.



Superior operation. Operator visibility is excellent because of higher deck and changed seat position. Console-type controls make operator's job easier. And on torque converter models, standard foot-operated decelerator can override hand throttle—free operator's hands for other controls.

Now—what can the D8 do for you? Here's the answer:

The Series H (available in direct or torque converter drive, according to your requirements) has been thoroughly field tested. A number of the big new tractors have been at work constantly in every kind of material on every kind of job. The statistics developed during these extensive tests prove conclusively that both bulldozing and pushloading production figures are *up*.

This means that you can move dirt faster and easier than ever before with a tractor in this size class. You get higher production, bigger profit—yet the big new D8 Series H has actually proved *more economical* to own and operate!

But find out for yourself. Get the full story from your Caterpillar Dealer, all the eye-opening facts and figures that can only be touched on briefly here. Then see this great new machine at work on your operation as soon as possible! You can't afford not to.

TWO MORE IMPORTANT OPERATOR CONVENiences

Higher speed. Completely new, long-life, direct drive transmission provides six speeds forward and six reverse. High speed has been increased to 6.3 MPH forward, 6.4 reverse to reduce cycle time. Operator can shift from any forward gear into a similar reverse gear

for vice versa by simply moving the forward-reverse lever.

Dependable oil clutch. By contractor and operator demands, the virtually service-free, easy-to-operate oil clutch has been retained in the new D8. Another important Caterpillar exclusive.



Multi-million-dollar research program pays off for you in every piece of Caterpillar equipment

The completely new D8 Series H you have just seen is dramatic proof of the power of Project Paydirt to give you the most modern, productive earthmoving equipment in the world. But this new tractor is just part of a continuing story.

Vast research and development facilities, the most extensive in the industry, bring improvement upon improvement to every piece of Caterpillar equipment. LOWBOWL Scrapers have revolutionized scraper design; the exclusive oil clutch has set new standards of long life.

Whether it's a better way to heat treat a bolt head, the Torsionflex Seat for operator comfort, or redesigning a tractor-scraper combination—nothing has been overlooked to increase the efficiency of Caterpillar machines.

Full Line Helps You Increase Production—Here's the line-up that's waiting at your Caterpillar Dealer to help you to more productive earthmoving.

Track-type Tractors—Besides the new D8, there's a full line of other Cat track-type Tractors ranging from the massive D9 (320 HP) to the smallest—the 63 HP D4. A full range of 'dozers (including the amazing Gyrodozer for D7 Tractors), scrapers and rippers expands the working applications of these tractors.

Traxcavators—The three Cat-built Traxcavators can fill your needs for a front-end loader because they're designed from the ground up for that purpose. Bucket capacities range up to 2½ cu. yd. All Traxcavators can be equipped with

the exclusive Side Dump Bucket, or other special buckets, teeth, 'dozers or forks.

Wheel-type Tractors—Caterpillar wheel-type Tractors feature speed, power, four or two wheel options, plus the exclusive, matching LOWBOWL Scrapers. These rubber tired combinations have an unequalled record for profitable earthmoving production.

Motor Graders—The No. 12 and No. 112 Motor Graders, both available with Preco Automatic Blade Control that maintains blade accuracy of $\frac{1}{8}$ " in 10', have the versatility to solve construction and maintenance grading problems quickly, efficiently and easily.

Your Caterpillar Dealer is ready *now* to supply the finest equipment for earthmoving. He backs what he sells with dependable parts and service. See him today.

Caterpillar Tractor Co., Peoria, Ill.; San Francisco, Cal., U.S.A.

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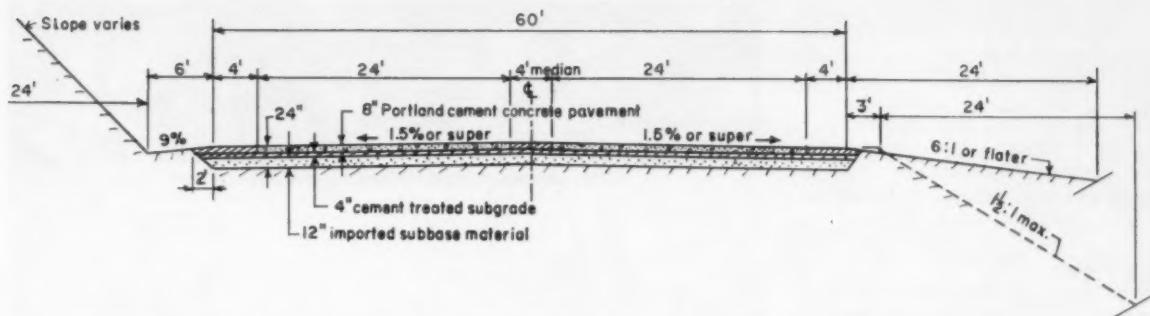
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PROVED IN THE FIELD



• First mixer drops load ahead of concrete spreader clear across roadway. Water for concrete supplied by tank truck.



• Typical cross-section details of paving and base system for one of the dual roadways on California U.S. 40 project.

(Continued from page 58)
forms. Back of the scarifier teeth were two sets of two moldboards that shaped loose material into two properly sized and gauged windrows.

Because the material at first stuck or clogged the openings between the windrow-forming moldboards, the contractor installed rotating paddles which were welded to a pair of drums (one in each throat of a pair of moldboards). These paddles kicked the material loose at the throats and cast the excess material onto a belt.

A separate engine on the rig rotated the paddles and drove the belt, sidecasting the excess material over the forms.

Finally, two V-type plow shares welded on the back of the frame cut notches into the tops of the windrows for receiving the bags of cement. Cement bags were opened just ahead of the roadmixer that follows. The reason for two windrows (even though the roadmixer could have handled all material in a single windrow) was the greater ease in performing the leveling operation to grade on the cement-

treated mixture.

A longitudinal roadmixer, coming next, supplied the needed water as it mixed cement with base material. The contractor added a 12-ft. re-blade on the rear of the roadmixer for spreading the processed material.

Next in line came a motor grader for leveling the spread mixture. After the second pass of the roadmixer between the forms and the leveling by the motor grader, a 12-ton, 3-wheeled roller com-

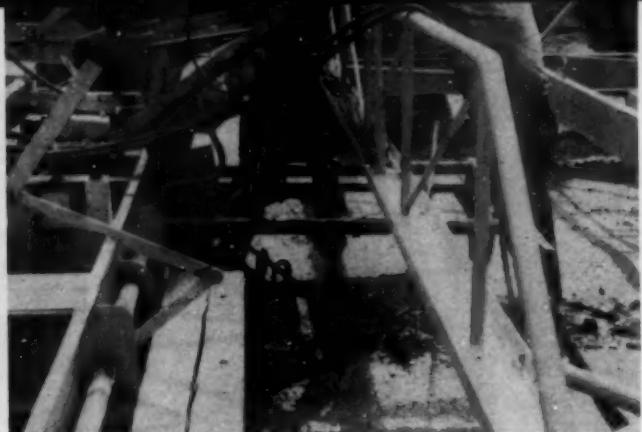
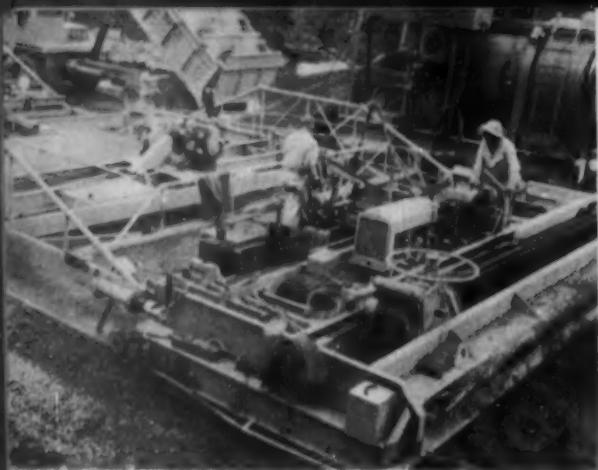
pacted the mixed base materials.

To get a true subgrade surface on the base course, a form-mounted finegrader followed the roller. Another 12-ton, 3-wheeled roller removed any raveling. Compaction was done by a self-powered multi-wheel, pneumatic-tired rollers.

Final checking was done with a scratch template. All dug-off material was discarded with hand shovels. Specifications prohibited low spots to be filled after being rolled.

• Spreading device towed by the Pettibone-Wood windrow mixer.



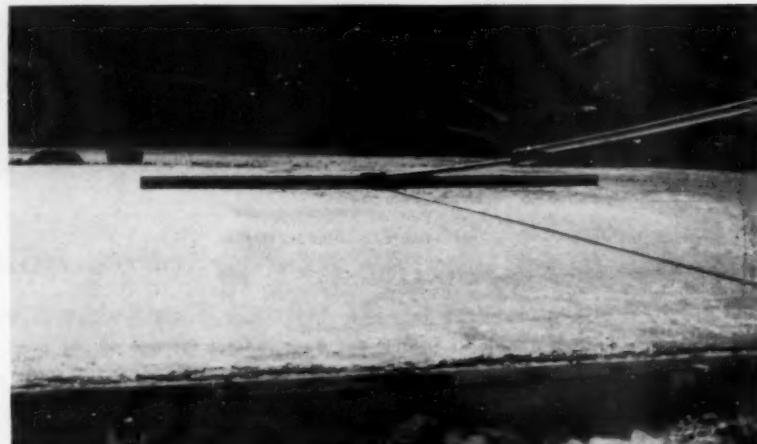


• (Left): Closer view of Blaw-Knox concrete spreader with Lewis leveler attachment, taken from side of road opposite the paver. (Right): Lewis leveler included a device for plunging tie bars into green concrete. Man with forked bar assisted on this job.

The cement-treated base course was then ready to be cured. For the curing cover, 0.20 gal. per sq. yd. of MC-2 liquid asphalt was applied with a bituminous distributor in one pass. Usually about 3,000 ft. of completed base course was prepared ahead of the concreting. But at times this lead was held to 500 to 800 ft., due to the rainy weather.

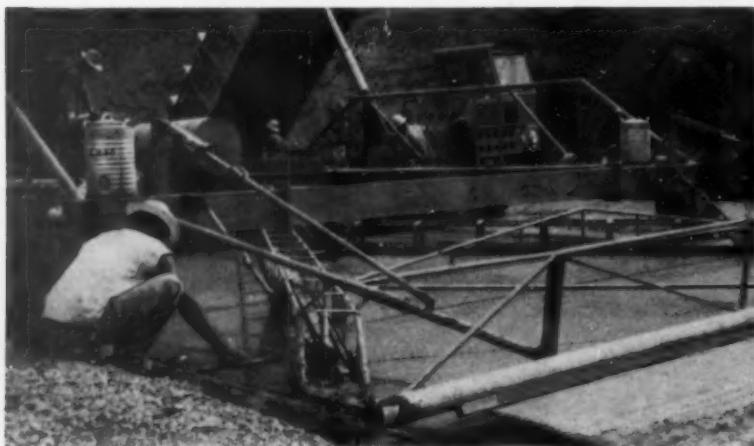
• **Placing Concrete.** The two dual-drum pavers worked from positions outside the forms. When pavers had to operate on the surface of a finished slab, as was the case for one half the job, about 1 to 1½ in. depth of sand was placed as a cushion between the paver crawlers and the concrete.

Eleven 6-compartment batch trucks used on this job were equipped with bodies designed by the paving contractor and built on the west coast. When trucks traveled over finished base or pavement,



• "Grout Rod" being used here to fill in low spots and rework the finished surface where necessary.

the loads were held to five batches in order to stay under the California legal axle weight maximum.



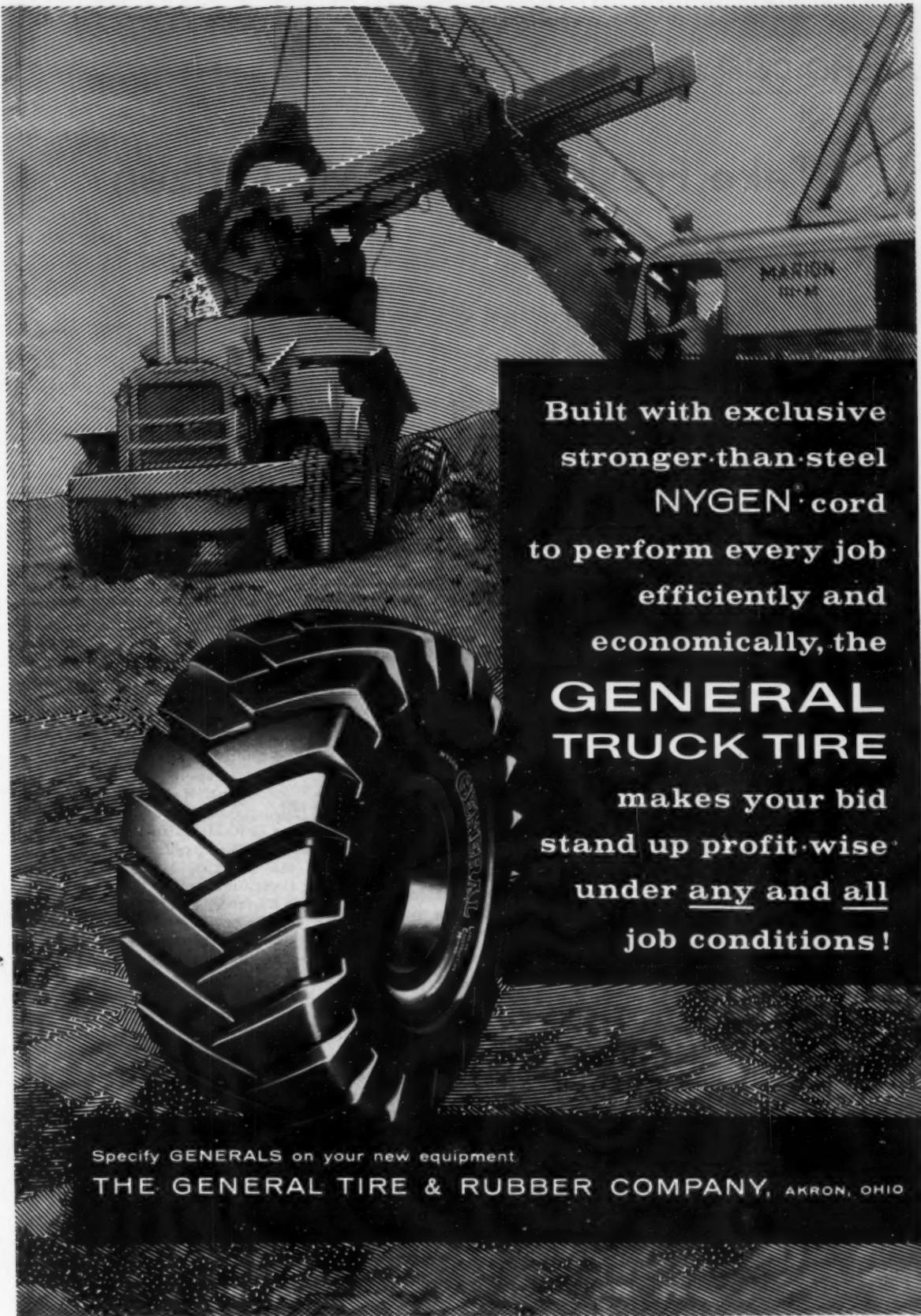
• Rear view of Lewis finisher showing V-shaped drag floats. Specially designed 6-compartment batch truck in background. Burlap drap in rear.

Very careful attention was paid to finishing in order that a smooth-riding surface would result. The standard make concrete spreader used on this job had a specially designed leveler with a single transverse screed carrying two internal vibrators, one inside of each form line. The screed was mounted midway of a 25-ft.-wheelbase frame that rides the forms with the spreader. (The screed of this unit is supported by the frame of the attachment and does not ride the forms.)

Behind this leveler combination came a finisher on which the tamping bar operated between two transverse oscillating screeds.

Next in line, instead of the longitudinal bull-float customarily used in the East, was another type of finisher. This machine has two transverse screeds supported midway on a 25-ft.-wheelbase framework behind which a V-type float

(Continued on page 66)



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AASHO Delegates

Take Fresh Look at Mr. Citizen

Right-of-way acquisition techniques, public relations, and related matters were the concern of several sessions at the San Francisco highway officials meeting.

By Duane L. Cronk

Director, Highway Information Services, Washington, D. C.

Exclusive to Roads and Streets

The wide sweep of subjects covered in the San Francisco meeting of the American Association of State Highway Officials—remarked on in last month's highlight report—took in one area which is of growing importance everywhere. We refer to the broad subject of "public relations"—i. e., citizen contact and influence, and such activities as rights-of-way acquisition which involve dealings with individual citizens and community groups.

● Right-of-way acquisition and the legal maneuvering involved in appraisal and condemnation of land for location of new highways came up for considerable attention. How to expedite the relocation of utilities ahead of the contractor was another potential bottleneck explored by the record delegation. And finally, officials seemed properly concerned with the persistent problem of public relations.

Attorneys were present in strength at the AASHO right-of-way sessions, testimony to the speed with which acquisition is becoming a form of major legal activity. A number of administrators indicated that it is no longer possible for a highway engineer to simply go out, visit briefly with land owners on the proposed right-of-way and return to the office with agreements. More and more cases are being carried to the courts, and finding their way into the hands of lawyers. The direct effects are complexity, delay and higher costs. In

fact, some states indicated that the increase of right-of-way is forcing sober re-appraisal of their Interstate cost estimates.

Highway Director Charles J. Dalthrop of South Dakota cited what was probably an exceptional but noteworthy example. In an attempt to obtain quick settlement and avoid ill will, the department offered \$35 an acre for scrub land which ranchers had only five years previous for \$1.50. The landowners refused to negotiate, however, and won an award of \$500 an acre from the circuit court. In fact, the judge also permitted claims for damages to federally-owned land which the ranchers were only leasing.

Although the state supreme court declared this action a mistrial, the projects involved were delayed two years.

● Utility Relocation. The subject of utility relocation came up for discussion. This is a problem of considerable concern to contractors whose operations are frequently delayed by faulty scheduling or lack of cooperation between highway departments and utility companies. In fact, C. W. Enfield, General Counsel for the BPR, has reported that one-third of state highway projects are "often seriously impeded" by delay in utility adjustments, that another third are "occasionally impeded."

He found that contractors were delayed because of utility relocation for six major reasons:

- (1) Lack of adequate advance planning and investigation,
- (2) Lack of adequate liaison between the highway agencies and the utility companies,
- (3) Lack of early firm commitment by highway agencies in scheduling projects for advancement to construction,
- (4) Failure to complete plans
(Continued on page 80)

Bartelsmeyer of Illinois AASHO President

Officers and directors for 1959 elected by the American Association of State Highway Officials:

President: R. H. Bartelsmeyer, chief highway engineer of Illinois, succeeding C. R. McMillan of South Carolina.

1st Vice President: David H. Stevens, chairman, Maine State Highway Commission.

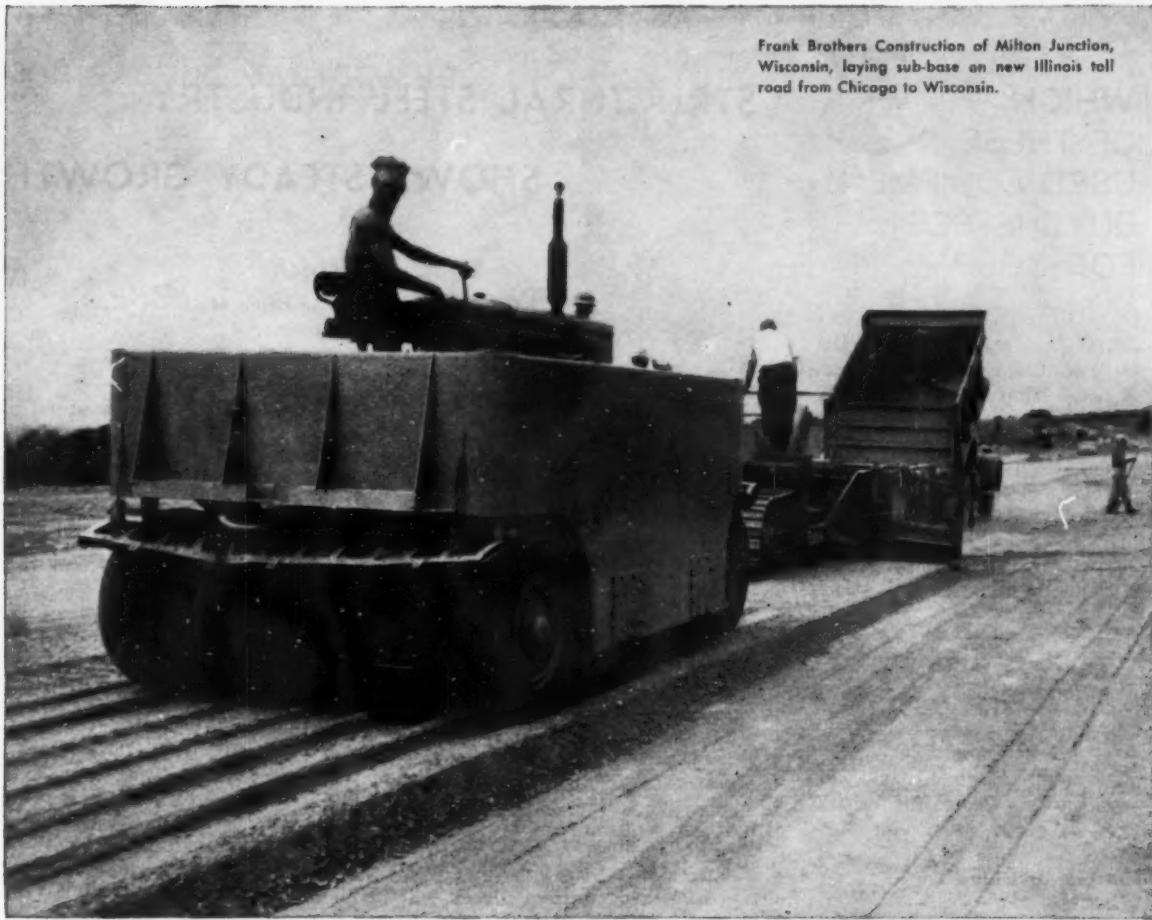
Regional Vice Presidents: J. N. Robertson, director, Department of Highways, District of Columbia; R. B. Richardson, director, Louisiana Department of Highways; John C. Mackie, Michigan commissioner of highways; Wm. E. Willey, Arizona state highway engineer.

Executive Committee: Elected to 10 member rotating committee were: F. A. Davis, Virginia (1959); John O. Morton, New Hampshire (1963); Wm. A. Bugge, Washington state (1963).

Treasurer: E. L. Roettiger, Wisconsin state highway engineer (re-elected).

Executive Secretary: A. E. Johnson (continuing), with headquarters 917 National Press Bldg., Washington, D. C.

Federal Highway Administrator: B. D. Tallamy (Ex-officio officer).



Frank Brothers Construction of Milton Junction, Wisconsin, laying sub-base on new Illinois toll road from Chicago to Wisconsin.

New toll road takes small toll on equipment thanks to Cities Service lubricants!

Laying sub-base for a 15-mile stretch of the new Illinois toll road is no easy task . . . especially when there's a 140,000-yard rock cut to be removed.

Rock or no rock, Frank Brothers must get the job done on time or they'd idle the paving contractors working the stretch directly behind them.

To do this, Frank Brothers' crushing plant and its many earthmovers and graders must operate without breakdown—without headache. And they do just that, thanks to Cities Service C-500 Motor Oil and other fine Cities Service products.

Recommended for Caterpillar diesel engines operating under the most severe service, Cities Service C-500 Motor Oil has the highest level of detergency-dispersion . . . a good reason why Frank Brothers' equipment stays on the job, hour after grueling hour.

"Not only is our Cities Service lubrication flawless, but we get the best possible field service wherever we go," says Phillip Frank.

If you're not getting just that from your supplier, talk with a Cities Service Lubrication Engineer. Or write: Cities Service Oil Co., Sixty Wall Tower, New York 5, N. Y.

"Wherever We Go, Cities Service provides excellent on-the-spot service to keep things running smoothly," says Phillip Frank. Portable crushing plant here produces 2,300 cu. yds. of sub-base per day.



With No Time To Waste, Frank Brothers' equipment must operate constantly without breakdown. "We do it with Cities Service Gasoline, Diesel Fuel and C-500 Motor Oil," says Mr. Frank.



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2 A "CERTIFIED BUY" covers units of any make in good condition. This type of protection carries your dealer's written guarantee of satisfactory performance.

3 A "BUY AND TRY" deal is just what its name implies. This protects you with your dealer's written money-back agreement.

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STRUCTURAL STEEL INDUSTRY

SHOWS STEADY GROWTH

By H. B. Dietrich

President, American Institute of
Steel Construction

The construction industry has successfully rebounded from the recession, and 1959 will see continued high activity in the fabricated structural steel industry. New orders for structural steel are expected conservatively to exceed 3,000,000 tons in 1959, compared to 2,800,000 tons booked in 1958.

Shipments are expected to reach 3,300,000 tons in 1959, keeping virtually in pace with current demand. During 1958 industry shipments totaled about 3,650,000 tons, due to continued withdrawal from a substantial backlog of unfilled orders.

The fabricated structural steel industry reduced its backlog by about one million tons during 1958. By December 31 the industry's work scheduled for future delivery will be approximately 1,700,000 tons, providing an operating backlog of about six months. This is further indication of the excellent supply situation that has prevailed during 1958.

The industry is better prepared than ever before to meet the challenge of a promised ten-year construction boom. Over the years structural steel fabricators have consistently expanded and modernized their producing facilities. During 1959 the industry will reach an all-time high in fabricating potential.

Total capacity of heavy structural steel shapes from the rolling mills will reach a new high of 8,000,000 tons in 1959 (including fabricated structural steel and also railroad cars, shipbuilding, machine bases and for export). This increase in capacity is due to new structural finishing facilities which have been under construction for several years representing a multi-million dollar expansion program by steel producers.

The construction market for the next decade (1959-1968) is estimated at \$800 billion, more than double the amount spent during

the last ten years. Sales of fabricated structural steel will be sparked by the Federal Highway Program as well as increases in all types of buildings during 1959.

New Shop Equipment

Editors Note: An example of the new techniques for structural steel is to be seen in the big shop of Lehigh Structural Steel Company, Allentown, Pa. This firm has in its new 40,000 sq. ft. plant a machine that can drill 18 holes at a time in steel plates up to 3½ in. thick and 9 at a time in heavy structural shapes. It nearly triples the drilling rate per hour attainable with a single spindle drill and eliminates the need for a mechanical layout.

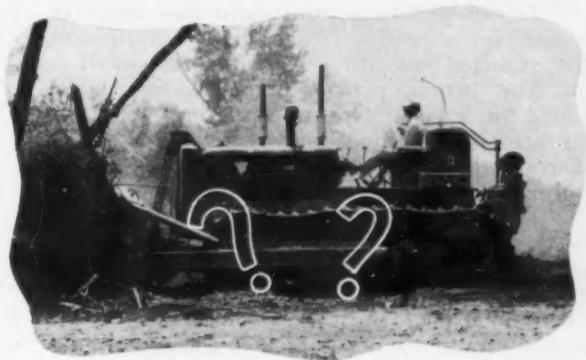
One man guides its operations, push-button style. The machine can simultaneously work the web and flanges of a rolled H-shape without repositioning.

The Space Drill was conceived and developed by members of Lehigh's management group, headed by George J. Neumann, vice president, and it was produced and assembled by Valley Engineering Company, Easton, Pa.

Puget Sound Bridge to Cost \$183 Million

A proposal for the financing and construction of a multi-million-dollar bridge and highway system across Puget Sound recently received favorable action from the Washington State Legislative Interim Committee on Highways.

It adopted in principle a recommendation by the consulting engineering firm of Porter, Urquhart, McCreary & O'Brien that the legislature authorize a bond issue of \$193,800,000 to finance the project, with the bonds to be backed by a pledge of the state motor vehicle fund as collateral.



Purchase Your Machines—or Rent?

This analysis for a tractor utilizes a procedure which will take much of the guesswork out of the question of buying vs. renting equipment. The author's comparison formula is published here for the first time anywhere. It may help you do some valuable double-checking on your staff's practical judgment.

By R. L. Peurifoy

Professor of Construction Engineering, Texas A & M College, College Station, Texas

Contractors and other users of construction equipment frequently are concerned with a decision as to whether to purchase or rent equipment. Under certain conditions it is financially advantageous to purchase, whereas under other conditions it is cheaper and more satisfactory to rent it. A logical and dependable method which will assist in reaching the correct decision is desirable. It is hoped that the analyses presented in this article will provide a solution to this question.

There are at least three methods under which a contractor may secure the use of construction equipment. He may

1. Purchase it
2. Rent it
3. Rent it with an option to purchase it at a later date

The method adopted should be the one that will provide the use of the equipment at the lowest total cost, combined with the most satisfactory arrangement to the contractor. Each method has both advantages and disadvantages which should be considered prior to making a decision. If cost is the only factor to be considered, an analysis of the cost under each method should give the answer. If other factors should be considered, they

should be evaluated and applied to the cost as a basis on which to reach a decision. The correct decision for one contractor will not necessarily apply to another contractor. For example a given contractor may engage in work which requires the use of wellpoint systems for most of his projects, while another may engage in such work on rare occasion, possibly not more often than once every year or two. It is probable that the former should purchase the equipment, while the latter should rent it. By the same reasoning a contractor should purchase equipment which he will use frequently, while he should rent equipment which he will use only rarely.

The purchase of equipment, when compared to renting it, has several advantages including the following:

1. It is more economical if the equipment is used sufficiently.
2. Its availability should be more dependable.
3. Since ownership should assure better control of preventative maintenance, the purchased equipment should be kept in better mechanical condition.

Among the disadvantages of owning equipment are the following:

1. It may be more expensive than renting, especially if the equipment is used only rarely.
2. The purchase of equipment may require a substantial investment of money that is needed for other purposes.

3. The ownership of equipment may influence a contractor to continue using obsolete equipment after superior equipment has been introduced.

4. The ownership of equipment designed primarily for a given type of work may induce a contractor to continue doing that type of work, whereas other work requiring different types of equipment might be available at a higher profit.

5. The ownership of equipment might influence a contractor to use the equipment beyond its economical life, thereby increasing the cost of production unnecessarily.

Perhaps an analysis of the cost of using a given unit of equipment under each of the three plans will assist in determining which plan is better. For this analysis consider a crawler tractor, driven by a 190-brake-horsepower diesel engine, equipped with a torque convertor drive, and a towing winch.

● *Cost of Purchasing the Equipment.* If the equipment is purchased, the cost of owning and operating it will include the following items:

1. Depreciation
2. Maintenance and repair
3. Investment: interest, insurance, taxes, and storage
4. Fuel
5. Lubrication

Since the cost of the operator should be the same for all three plans, it may be disregarded for the purpose of a comparison. Also, if the cost of fuel and lubrication are the same, these costs may be disregarded.

Assume that the tractor will have a useful life of five years, that it will be used an average of 2,000 hours per year, and that its salvage value after five years will be \$3,000. Assume that the cost of maintenance and repairs during its useful life will be 90 percent of the cost of depreciation during the same period.

If a contractor can borrow money to purchase equipment and conduct his business at 6 percent simple interest per year, he should use this rate in determining the interest cost of owning equipment. However, if the tractor is financed through the dealer, it is probable that the quoted interest rate will be 6 percent, but since this rate is applied to the full debt for the full time of the payment, the effective rate is about 12 percent per year, and this rate should be used, which has the effect of increasing slightly the cost of owning equipment. This analysis will be based on using 7 percent simple interest.

The amount of fuel used will depend on the extent to which the engine is operated at full power, which is seldom done for extended periods of time. Assume that the engine is operated at 75 percent of its maximum power for 45 minutes per hour. Since the brake horsepower is 190, the total power for calculating fuel consumption will be about 15 percent greater, which will be $190 \times 1.15 = 220$ horsepower. In an average hour the power requiring fuel will be $220 \times 0.75 \times 45/60 = 124$ horsepower hours. The consumption of fuel should be about 0.04 gallon per horsepower

hour. This will be $0.04 \times 124 = 4.96$ gal., say 5 gal. per hour. The cost of lubricating oil and greasing should be about one-half the cost of fuel.

The cost of owning and operating, calculated on an hourly basis, should be as follows:

Cost at the factory	=	\$29,255
Freight from factory to the purchaser	=	1,245
Total delivered cost	=	\$30,500
Less estimated salvage value	=	3,000
Net cost less salvage value	=	\$27,500
Average value, $0.6 \times \$30,500$	=	\$18,300 (1)
Annual costs:		
Depreciation, $\$27,500 \div 5$ yr.	=	\$5,500
Maintenance and repairs,		
90% $\times \$5,500$	=	4,950
Investment, 13% $\times \$18,300$	=	2,380 (2)
Total annual or fixed cost	=	\$12,830
Cost per hour:		
Fixed cost,		
\$12,830 $\div 2,000$ hr.	=	\$6.42
Fuel, 5 gal. @ \$0.20	=	1.00
Lubricating oil and grease	=	0.50
Total without operator	=	\$7.92

(2) Investment rates are: interest, 7 per cent; insurance, 1 per cent; taxes, 1.5 per cent; and storage, 3.5 per cent, which equals 13 per cent.

The cost per hour will vary somewhat with the cost of freight from the factory, with the cost of fuel, and with the number of hours it is used per year. If it is used more than 2,000 hours per year, the cost will be less, whereas, if it is used fewer than 2,000 hours per year, the hourly cost will be more. Adjustments should be made to fit actual conditions.

● *The Cost of Renting the Equipment.* While there are no uniformly established rental rates for construction equipment, the Associated Equipment Distributors, 30 East Cedar Street, Chicago, Illinois, publishes annually a booklet entitled *Compilation of Rental Rates for Construction Equipment*, which gives representative rates found to be in effect throughout the United States. The rates are representative of the charges made when equipment is rented by the month, week, or day. The rates do not include the freight cost to and from the lessor, the cost of repairs resulting from other than normal wear, which the lessee must pay, or the cost of fuel and lubrication.

The general practice of the industry is to base rental rates on an 8-hour day, 40-hour week, and 175-hour month of a 30 consecutive day period.

For the tractor under consideration the quoted rate per month, based on the 1958 edition of the *Compilation*, is as follows:

Tractor only	\$2,272
Winch	379
Total	
	\$2,651

Since the contractor who rents the tractor is responsible for certain repairs required during the operation of the equipment he must add to the monthly rental cost an appropriate amount to cover this cost. Assume that this cost will be one-third of the total cost of maintenance and repairs, as used under the cost of owning and operating equipment.

Neglecting the cost of transporting the tractor from the lessor to the job, which omission is justified only when the cost is not great, the cost per hour for renting the tractor will be

Rental, \$2,651 ÷ 175	= \$15.15
Maintenance and repairs, $\frac{1}{3} \times \$4,950 \div 2,000 \text{ hr.}$	= 0.82
Fuel, 5 gal. @ \$0.20	= 1.00
Lubricating oil and grease	= 0.50
 Total less operator	= \$17.47

● *Cost of Renting Equipment With an Option to Purchase.* Under this plan a contractor may rent equipment at the customary rate with a provision that will permit him to purchase it at a future date if he wishes to do so. In the event he decides to purchase it, a specified portion of the rental paid may be applied toward the original purchase price of the equipment. The agreement frequently specifies that 90 percent of the rent paid may be applied to the purchase.

The effect of this plan, neglecting interest, is to increase the purchase cost of equipment by 10 percent for that portion of the cost which is paid for under this plan, when compared to an original purchase. However, since it is not necessary to pay interest, taxes, insurance, and storage on equipment that is rented, the resulting saving in those costs will reduce the increase in the purchase cost. If the agreement requires the contractor to pay all maintenance and repair costs, an appropriate amount should be added to the other costs to cover this item.

Apply this plan to the tractor previously described, whose delivered cost new is \$30,500. If, after renting it for eight months, the contractor wishes to purchase it, his transaction will be as follows:

Original cost	= \$30,500.00
Rent paid, 8 mo. @ \$2,651 = \$21,208	
Amount applied to the pur- chase, 0.9 × \$21,208	= 19,087.00
Balance due	= \$11,413.00

Since the tractor, with only eight months of use, may be purchased through an additional expenditure equal to less than one-half of its original cost, it appears that such a purchase should be made if there will be further need for the tractor. Certainly it should be a better investment than purchasing a new tractor at this time. Also, any salvage value which may be realized when the tractor is disposed of will reduce the net addi-

tional cost of buying and using it.

If the user of the equipment wishes to determine if he should purchase the tractor after he has rented it for eight months, he should make his analysis of costs on the basis of spending an additional \$11,413.00 for equipment which still has 4 years and 4 months of useful life. The amount spent for rent has already been paid out, or must be paid, and is not applicable to future costs of owning and operating the tractor.

The factors that should be considered are as follows:

Additional cost	= \$11,413
Estimated salvage value	= _____
Net depreciation	= \$ 8,413
Additional useful life, 4.33 years	
Hours used per year, 2,000	
Average value during useful life, $0.62 \times 11,413$	= \$ 7,007 (1)
Annual cost:	
Depreciation, $8,413 \div 4.33 \text{ yr.}$	= \$ 1,945
Maintenance and repairs, same as for equipment purchased new,	
$0.9 \times \$5,500 (3)$	= 4,950
Investment, 13% × \$7,007	= 910
 Total annual or fixed cost	= \$ 7,805
Cost per hour:	
Fixed cost, $\$7,805 \div 2,000$	= \$3.90
Fuel, 5 gal. @ \$0.20	= 1.00
Lubricating oil and grease	= _____
 Total less operator	= \$5.40

(3) This rate and cost may be higher than is used here, depending on the condition of the tractor, because the cost of maintenance and repairs tend to increase with the age of the unit, in which event it should be increased.

Thus a contractor who has paid rent for eight months on this tractor can now purchase it under terms which will enable him to own and operate it for the balance of its useful life at a very favorable cost. However, the results of this analysis should not be used as a justification to rent new equipment with a purchase option as a means of reducing the total cost of using it for its entire life.

● *Compare the Cost of Purchasing Equipment New with Renting.* For the conditions previously analyzed the cost of owning and operating the tractor when purchased new, was found to be \$7.92 per hour, whereas, the cost of renting and operating it is \$17.47 per hour. Obviously it is much cheaper to own it so long as it is used 2,000 hours per year. But suppose that it is used less than 2,000 hours per year. While certain costs, such as maintenance and repairs, fuel, lubrication, and greasing are related to the use of the equipment, other costs including depreciation and in-

(Continued on page 76)



The Huber-Warco 5D-190 blades down a fill on Wisconsin's new Hudson-Eau Claire Road.

Gerke gives 5D-190 a tough

Lawrence Gerke, a contractor in Merrill, Wisconsin, was awarded one of the first contracts on the new Hudson-Eau Claire Road. This important road in the Wisconsin Interstate System will run from the Minnesota state line to the Illinois Toll Road.

Chosen to handle all of the grading assignments in this rugged area was a Huber-Warco 5D-190, a highly efficient, dependable unit. This terrain was just the ticket for the 5D-190 that combines a 195 h.p. diesel engine, torque converter, tail shaft governor and power shift transmission.

In handling this job, Gerke will move over one million yards of dirt, and 300,000 yards of rock. There are eight major cuts with the maximum 115 feet, and five major fills with the biggest being 70 feet.

The 5D-190's assignment . . . build and maintain the haul roads, cut all the ditches, and work on the slopes after the cuts and fills are completed. This machine will also spread the 9" lift of granular sub-base, and then after all the paving is completed the unit will spread top soil over the excavated area before seeding.

"We needed a grader that could do a man-sized job in keeping the haul roads clear and leveling off the fills," said Paul Potts, the grade foreman on the job. He continued, "that's a big order for one machine but the powerful 5D-190 is doing a good job. It's a very dependable grader and we're well pleased."

There are three major haul roads on this job with the average haul being 1,000 feet.

Huber-Warco Company

MARION, OHIO

Huber-Warco on the job

.....

There's one grader on the job
handling all of the grading jobs,
and it's the powerful, dependable
Huber-Warco 5D-190

assignment

Constant travel by the nine pans and trucks really chew up the roads. The 5D-190 keeps these roads smooth, and keeps the haul loads moving on schedule up the steep inclines.

Smooth haul roads are also easier on tires, and with tire costs of up to \$4500.00 each, the elimination of ruts and sharp rocks on the roads mean longer tire life . . . an important cost factor on jobs.

The man-sized, work-producing features of the powerful, efficient Huber-Warco 5D-190 motor grader have been important to many contractors on projects throughout the world. Let your Huber-Warco distributor show you what these features can mean to you on your jobs.

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MAINTAINER



3-WHEEL ROLLERS

14 cars and trucks per minute today . . .

Here's one reason why Ohio's

Pounding traffic! Growing traffic volume! Greater and greater axle loads!

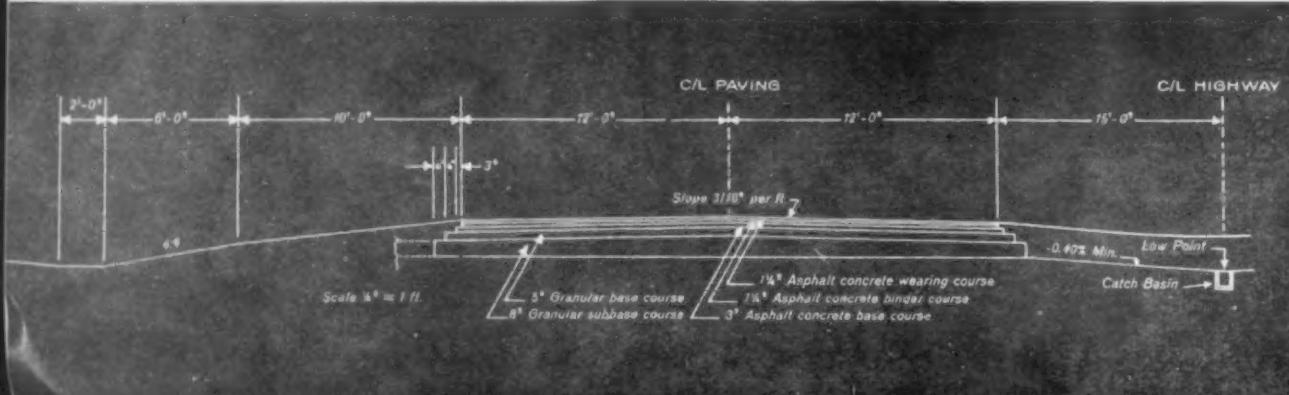
These assaults on pavement structures are **not** restricted to the 90-10 Interstate highways. They're common problems faced by engineers responsible for thousands on thousands of miles of road like

Ohio's new State Route 73 . . . roads which are to be built largely out of State funds and wholly maintained with these monies.

In most terrain these roads . . . like your Interstate roads . . . should be Asphalt-paved. For many reasons! Perhaps the **most** important is that modern Asphalt

Typical of modern heavy-duty Asphalt sections is this one for Ohio's 5-mile State Route 73 between Middletown and Franklin. Median section is modified to a raised and curbed 15-foot section in urban areas. Pavement must support a heavy traffic

of trucks carrying steel, machine tools and other industrial products produced locally. Cost per sq yd for this Asphalt road \$3.03; \$2.00 per sq yd under the prevailing price for reinforced concrete.



... twice as many in 1975!



new Route 73 is Asphalt-paved

pavement structures are being built today to handle any desired loads with any desired built-in durability ... and these roads save money. Cost less to build, less to maintain.

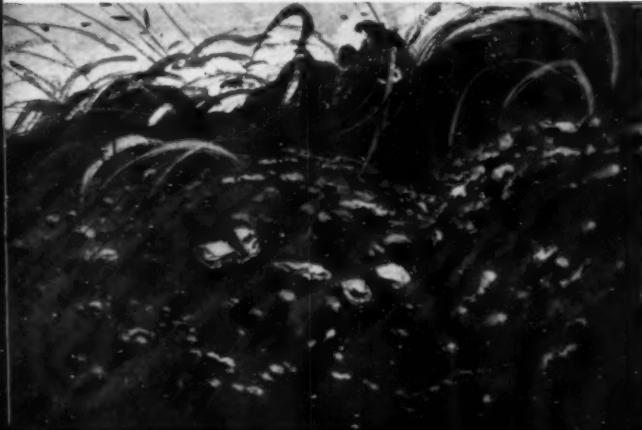
Your State can lay more road for the same money if you design for Asphalt concrete. More road means the traffic load on all pavements in your State can be kept at a maintenance-saving minimum.

THE ASPHALT INSTITUTE
Asphalt Institute Building, College Park, Maryland



Glacial till in right-of-way favored Asphalt pavement construction. Whenever sub-soil of this type is found it provides excellent natural subgrades for Asphalt paving. Proximity of suitable crusher-run aggregate also favored use of Asphalt on Route 73.

Comfortable! Durable!...because it's modern Asphalt concrete. Notice the smooth-riding, skid-resisting surface. Notice the visibility, too, of the traffic markings on Route 73. With Asphalt concrete, this road sets a standard for quality construction.



RENT OR PURCHASE MACHINES?

(Continued from page 71)

vestment are pretty well independent of the use.

Determine the cost of owning and operating the tractor if it is used only 600 hours per year. Since some of the costs of maintenance and repairs are related to time, instead of the use, and thus are not affected by the reduction in use, while other costs are related to use, we will not take the full reduction in the annual cost of maintenance and repairs resulting from the decrease in the use. Assume a reduction of 50 percent in this cost. On this basis the cost of owning and operating the tractor will be

Annual cost:

$$\text{Depreciation, } \$27,500 \div 5 \text{ yr.} = \$ 5,500$$

Maintenance and repairs,

$$\$4,950 \div 2 = 2,475$$

Investment

$$= 2,380$$

$$\text{Total annual or fixed cost} = \$10,355$$

Cost per hour:

$$\text{Fixed cost, } \$10,355 \div 600 = \$17.26$$

Fuel, 5 gal. @ \$0.20	=	1.00
Lubricating oil and grease	=	0.50
Total less operator	=	\$17.76

Thus it appears that if the tractor will be used only 600 hours per year it costs approximately the same to own and operate it as it does to rent it. The break even point, expressed in hours of use per year, for which the cost of owning and operating is the same as for renting the tractor is approximately 600 hours. If the tractor will be used less than 600 hours per year, it will be cheaper to rent it, whereas if it will be used more than 600 hours per year it will be cheaper to purchase it.

There is an intangible factor, but sometimes a very important one, which might influence a decision to rent instead of purchasing equipment. This factor is that when a contractor, who is financing his operations with limited capital, rents equipment instead of purchasing it, he will not tie up money or credit in equipment when the money or credit may be needed for other purposes.

An equation which should give the approximate
(Continued on page 90)

Should You Buy it or Rent it?

Formula for use in finding the critical number of hours of annual use, around which this question can be answered with minimum uncertainty.

Annual cost:

$$\text{Depreciation} = \frac{P-S}{N}$$

$$\text{Maintenance and repairs} = q \frac{P-S}{N}$$

$$\text{Investment} = iQP$$

$$\text{Hourly cost} = \frac{P-S}{Nn} + q \frac{P-S}{Nn} + \frac{iQP}{n}$$

The hourly cost of renting the equipment will be

$$\text{Rental only} = \frac{C}{175}$$

$$\text{Repairs} = \frac{1}{3} p \frac{P-S}{Nn}$$

$$\text{The sum} = \frac{C}{175} + \frac{1}{3} p \frac{P-S}{Nn}$$

Equate these two hourly costs and solve for n

$$\frac{P-S}{Nn} + q \frac{P-S}{Nn} + \frac{iQP}{n} = \frac{C}{175} + \frac{1}{3} p \frac{P-S}{Nn}$$

$$\frac{P-S + q(P-S) + iQP}{Nn} = \frac{3NnC + 175p(P-S)}{525 Nn}$$

$$3NnC + 175p(P-S) = 525 [P-S + q(P-S) + iQP]$$

$$n = \frac{525 [P-S + q(P-S) + iQP] - 175p(P-S)}{3NC}$$

For the tractor previously considered the following

values will apply:

$$P = \$30,500$$

$$S = \$ 3,000$$

$$P-S = \$27,500$$

$$N = 5$$

$$p = 0.9$$

$$q = 0.2 + 0.000035n$$

$$i = 0.13$$

$$Q = 0.60$$

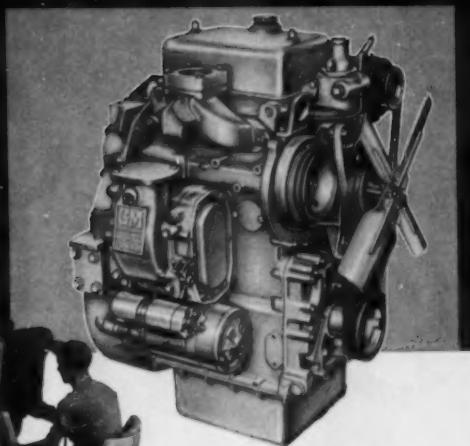
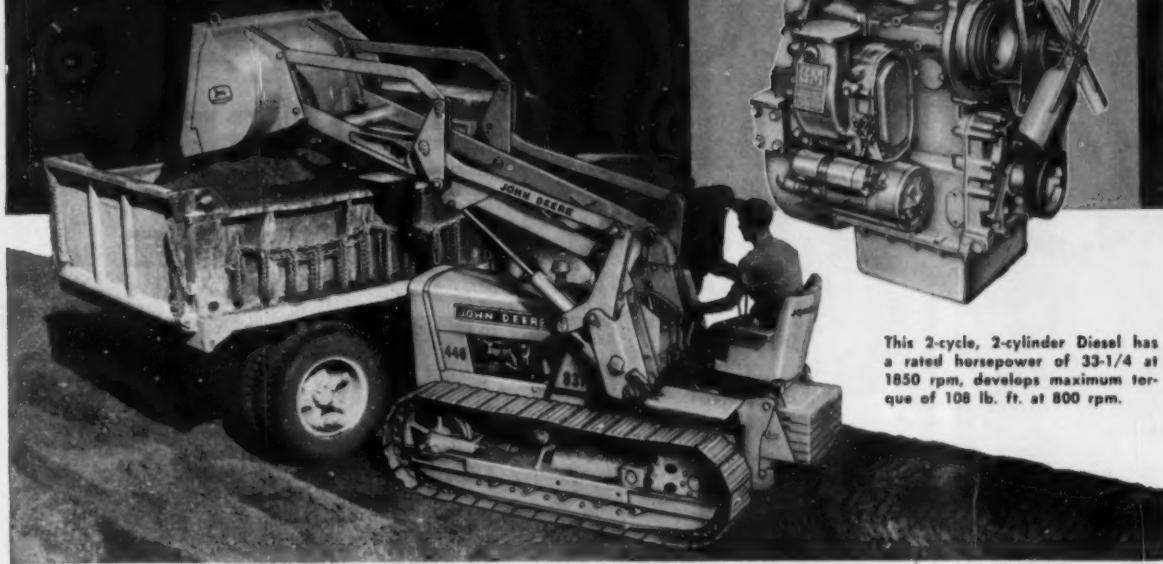
$$C = \$2,651$$

Substituting these values in the formula we get

$$n = \frac{525 [27,500 + 27,500(0.2 + 0.000035n) - 5 \times 0.13 \times 0.6 \times 30,500]}{3 \times 5 \times 2,651}$$

$$- \frac{175 \times 0.9 \times 27,500}{3 \times 5 \times 2,651}, \text{ or } n = 600 \text{ hours.}$$

Now...a JOHN DEERE DIESEL Crawler-Loader *to Cut Your Costs*



This 2-cycle, 2-cylinder Diesel has a rated horsepower of 33-1/4 at 1850 rpm, develops maximum torque of 108 lb. ft. at 800 rpm.

It's the job-proved John Deere "440," now available with a husky, high-torque Diesel engine! It not only provides a new measure of smooth, rapid response, but delivers 10 per cent more power than previous crawler-loaders in the line. And, the "440's" optional clutch-type direction reverser makes it possible to take full advantage of this new power in loading, earth moving, and other materials-handling jobs.

There's more than new power behind this cost-cutting loader. Advanced engineering puts the bucket's exceptional breakout capacity under greatly simplified control. When bucket is dumped from full-height position, it returns to the ideal 9-degree digging angle by use of the boom control only.

For details, send coupon today. For a demonstration on your job, see your John Deere industrial dealer, now!

TWO NEW JOHN DEERE BACKHOES!



Choose the center-mounted 50 or, for flush digging, the five-position 31. Each features two-lever control, plus great new pry-out power.



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Industrial
TRACTORS AND EQUIPMENT

LOADS EVEN THE LARGEST TRUCKS

7/8-yard bucket has a dumping clearance of 7 feet 10 inches.

NEW PRY-OUT BOOSTS WORK OUTPUT

35-degree bucket roll-back with 8,500 pounds pry-out action.

ROLL-BACK LINKAGE SPEEDS WORK

When the bucket is used at 65-degree grading angle, for bulldozing and back-filling, it is only necessary to operate the boom-control lever to raise and dump the bucket.

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can more than double
working time
between blade changes

Because X-TRA-EDGE blades give you more useable steel, more wear, your graders are "down" less often.

Here are examples of extra working time:

Using the $\frac{1}{2}$ " to $\frac{3}{4}$ " x 8" X-TRA-EDGE section, the wear compared with ordinary blades is—

compared with $\frac{5}{8}$ " x 8" section—113%

compared with $\frac{1}{2}$ " x 8" section—133%

compared with $\frac{5}{8}$ " x 6" section—233%

compared with $\frac{1}{2}$ " x 6" section—275%

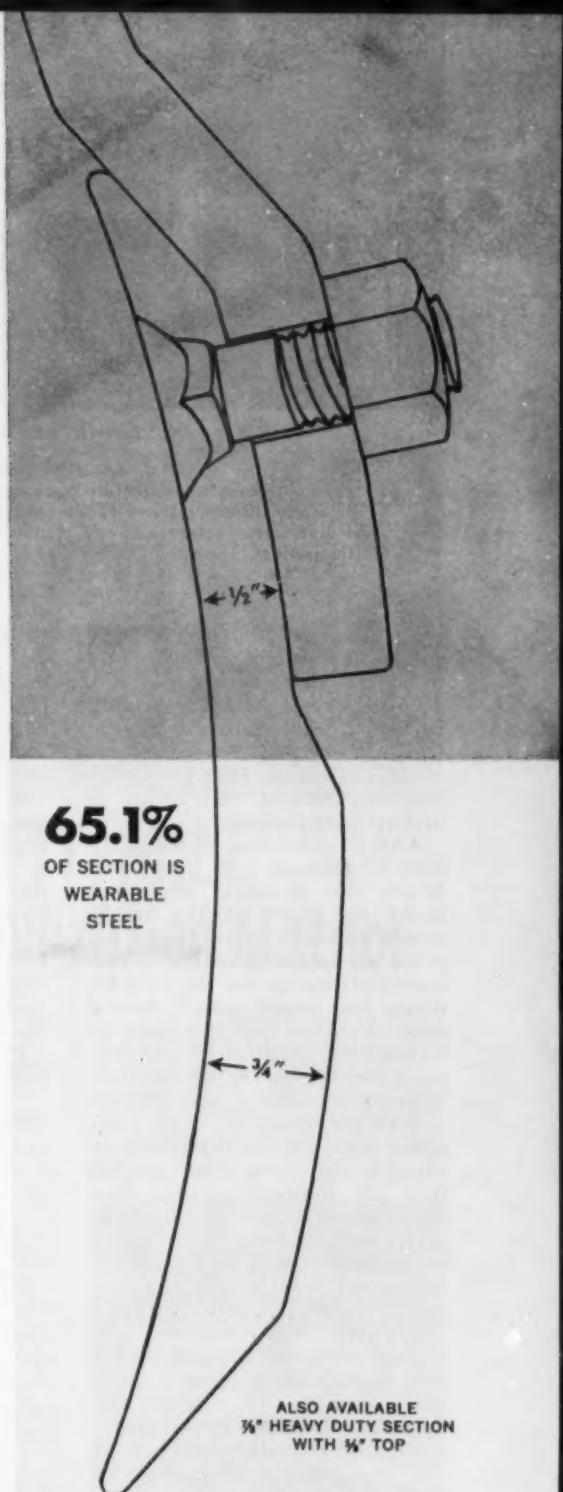
And because Pacal increases the thickness in the working area of the blade without increasing waste thickness, you save extra money. Also, by getting more working time between blade changes, you save proportionately on bolt costs.

Write, wire or call for information and switch to X-TRA-EDGE blades.



You Can See It's Pacal

NOW! More than ever it's important to use Pacal Heat Treated Plow Bolts. With the longer life of X-TRA-EDGE blades you need a bolt that has a head as hard as the blade. Pacal Heat Treated Bolts have triple strength . . . do not stretch or loosen.



Pacal X-TRA-EDGE Section Shown Here Full Scale

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All Steels Furnished By Pacal Made in U.S.A.



Some of AASHO's New Leaders for 1959

- From left: F. A. Davis, AASHO executive committee appointee (chief engineer, Virginia); William A. Bugge, executive committee director, Washington; Ralph R. Bartelsmeyer, AASHO's new president (chief highway engineer, Illinois); David H. Stevens, first vice-president (commission chairman, Maine); William E. Willey, vice-president (state highway engineer, Arizona); John O. Morton, executive committee (commissioner, New Hampshire).

(Continued from page 66)
and acquire right-of-way sufficiently in advance of construction,

(5) Lack of adequate funds, personnel, and equipment on the part of Utility companies,

(6) Lack of adequate knowledge regarding location and nature of underground facilities.

AASHO Executive Secretary Alfred E. Johnson told *Roads and Streets* that if utility relocations could be expedited the results would undoubtedly be "lower bid prices and the elimination of contractor claims against the state for delays and added costs." Several states described how they have alleviated this problem by establishing a working liaison between their highway department and utilities.

Arkansas is one of those states which have set up procedures to expedite the removal of utilities from the construction site. Four employees of the organization were designated to devote their full time to this operation. They are a "utility engineer" who is both a civil engineer and an electrical engineer; an assistant utility engineer who has an electrical engineering education and background; a right-of-way agent; and a stenographer. This tight little unit has developed a standard procedure which in itself eases this operation. But beyond that, it serves as a "trouble-shooting" team, working closely with utility companies to overcome obstacles as they threaten to delay a project.

● **Public Information.** Sessions sponsored by the AASHO Committee on Public Information drew record attendance during the convention. Officials from every level of the state departments indicated the importance of public relations in

their various roles — construction, right-of-way and operations.

Speakers in the public information sessions reiterated the importance of keeping the public informed on highway affairs. The result will be, they declared, a definite easing of objections to current projects and vastly more enthusiastic acceptance of future plans.

"It has been proved conclusively time and again that an uninformed public is a suspicious public," James W. Goodrich, Chief of Public Information for the Ohio Highway Department asserted, "and a suspicious public thinks and acts slowly, hesitatingly and often wrongly."

If highway administrators want to win support for their programs

and avoid constant harassment, they must first of all see that a stream of information flows freely from their various departments to the general public, he said.

The opportunity of accomplishing this through public hearings was described by two state officials—Frank D. Marzitelli, deputy commissioner of the Minnesota State Highway Department, and Horace J. Gunn, public information officer of the Utah State Road Commission. Both officials credited thorough revelation of highway plans for an improvement in public appreciation.

Nearly 7,000 citizens have attended 32 information hearings set up
(Continued on page 82)

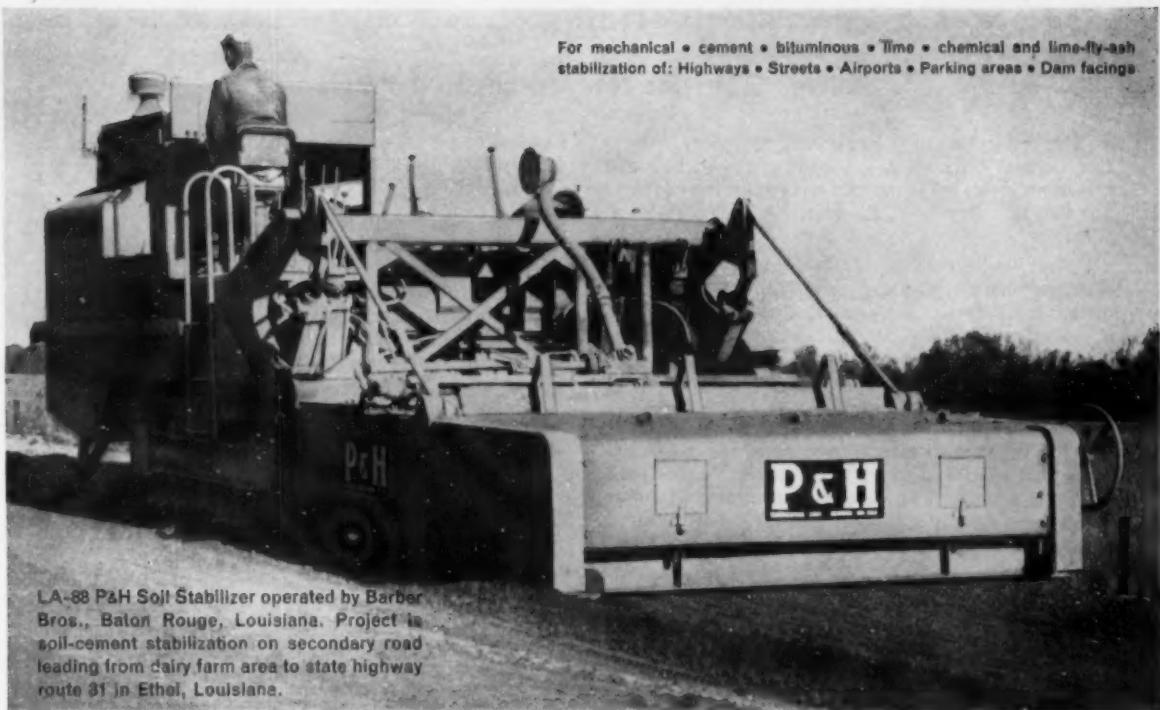
Progress Toward "Results" Specs

The growing tendency of state highway departments to specify the results they expect from a contractor, rather than the methods to be employed, was indicated in several instances during the AASHO convention. One engineer pointed out that this has been a natural development of recent years as states have strived to streamline their project supervision procedures.

Charles E. Shumate, Assistant Chief Engineer of the Colorado State Highway Department, said:

"As one example in our state, prior to the Interstate program, we specified not only the number and type of rollers to be used in compaction, but we also retained the authority to designate the number of rollers to be used, the number of passes to be made, the amount of water to be used, and on top of it all, we paid hourly rates on the rollers and paid for the water!"

"This was changed a few years ago, and our specification provides now that the contractor shall bid so much per cubic yard for compaction to a specified density, and he can obtain it in any manner he so elects. I can assure you that it took us some little while to bring our field engineers and inspectors back to the realization that this was a contractor's responsibility—something which did not require the close constant supervision but only the end result."



For mechanical • cement • bituminous • lime • chemical and lime-fly-ash stabilization of: Highways • Streets • Airports • Parking areas • Dam facings.

LA-88 P&H Soil Stabilizer operated by Barber Bros., Baton Rouge, Louisiana. Project is soil-cement stabilization on secondary road leading from dairy farm area to state highway route 81 in Ethel, Louisiana.

EVERY MILE IS A "PROFIT-MILE" with **P&H** Single Pass Stabilization Method

Mile after mile, the P&H Single Pass Soil Stabilizer meets these specifications by maintaining the same high degree of uniformity of mixing as that obtained by laboratory methods.

The P&H Single Pass Soil Stabilizer is designed and built specifically to conform with the single pass stabilization method, *regardless of soil*. Only P&H offers a true, single pass traveling mixing plant. In a single pass, with one operator, at a rapid rate of speed, it performs these exacting operations:

1. Proportions materials in accordance with laboratory design.
2. Pulverizes fine grained soil.
3. Blends all materials uniformly.
4. Adds specified amount of liquids accurately.

5. Mixes all materials to a high degree of uniformity.

6. Spreads material to a uniform loose density for compaction.

On *all* types of single pass operation, P&H will give you accuracy, speed and economy to give you more "profit-miles" on every job.

The rate of production and cost of operation for the P&H Soil Stabilizer and auxiliary equipment required is worked out in detail. With this data (the rate of production on various roadway thicknesses and widths and the type of materials to be encountered) the cost of any given condition can be computed very quickly.

Before you bid your next sub-base job, it will benefit you to have a copy of the P&H File-Folder Series, "Low-Cost Highways." Write Department 512A, Harnischfeger Corporation, Milwaukee 46, Wisc.

Specifications designed around the single pass method of soil stabilization insure the construction of sub-bases exactly as they are designed.

SOIL STABILIZATION FOR HIGH TYPE PAVEMENT BASE REQUIRES THIS QUALITY SPECIFICATION FOR PROCESSING

"Mixing of soil and/or soil combination and additives shall be accomplished by the use of a single pass traveling mixing plant of the type which leaves the material spread for immediate compaction."

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Better Statistics Needed on Road Program

The need for improved progress reporting to the highway construction industry was brought out at an AASHO session in a discussion by Duane L. Cronk, Director of Highways Information Services.

"The roadbuilding industry—contractors, materials suppliers and equipment manufacturers and distributors—must have a statistical picture of progress on the highway program all their own. The amount of work you have accomplished, the amount under way and the amount you plan to contract during 1959 is of vital importance to these businessmen. They must have such information to plan their productive capacity, to build their inventories, and to develop their sales program. It is not out of idle curiosity that they come to you for detailed information about project plans. They need your help."

Mr. Cronk reminded the meeting that some rather unfortunate production problems have resulted from reports to the industry which, because of very strange terminology or translation, have been misleading. "The high cost of such miscal-

culation will come out of our future highway dollar just as surely as the cost of right-of-way," he said.

The highway industry needs data on the progress reports on the Interstate System in terms of actual production units . . . grading accomplished and scheduled, lane-miles of paving due for awarding, and utilization of steel and other materials. The industry wants to know how the Interstate program is progressing, not in dollars alone, but in terms of things it does and things it makes.

Highway departments should make a conscientious effort to forecast the demands their state program will create for construction industry services and materials during the foreseeable future—at least, for the year ahead.

Cronk cited the California administration, which calculates its material needs and its contract plans nine months in advance of the year in question. "This is the kind of advance planning which contractors and materials producers would appreciate in every state," he said.

by Mr. Gunn's department during the last 12 months. This conscientious effort to expose the department commission's program has won sound press support. The result has been editorial comments like these two, instead of carping criticism:

● "The state highway commission is to be commended for providing these opportunities for the people to find out what they wish to know about the new highway. Developing a sense of public participation and approval, criticism and lack of support can be minimized.

● "The highway officials have shown local people every courtesy and consideration. We wish to congratulate the state highway commission on the great amount of research and planning that has gone into this project."

PAVING JOBS

(Continued from page 64)

covered the entire 24 ft. slab width. This float dragged along the surface as the machine moved forward. A burlap drag was attached at the back.

● "Grout Rod". Behind the drag six men cleaned up what little the machinery missed, and performed the edging. Two men operated what is called a "grout rod"; no flat-faced hand-operated floats were used on this job. The "grout rod" is a float finisher made out of a 40" x 10' aluminum tubular head to which is welded, at right angles, a 24 ft. aluminum tube handle. In a typical operation, one man pushed the grout rod transversely across the concrete surface. When it reached the other side another man lifted the head up and over the ridge of grout thus collected, and the rod operator pulled it back. The rod

was thus used from only one side because traffic had to be maintained on half of the roadway on the other side.

Then followed hand finishing, another burlap dragging, and the slab was ready for the membrane curing cover.

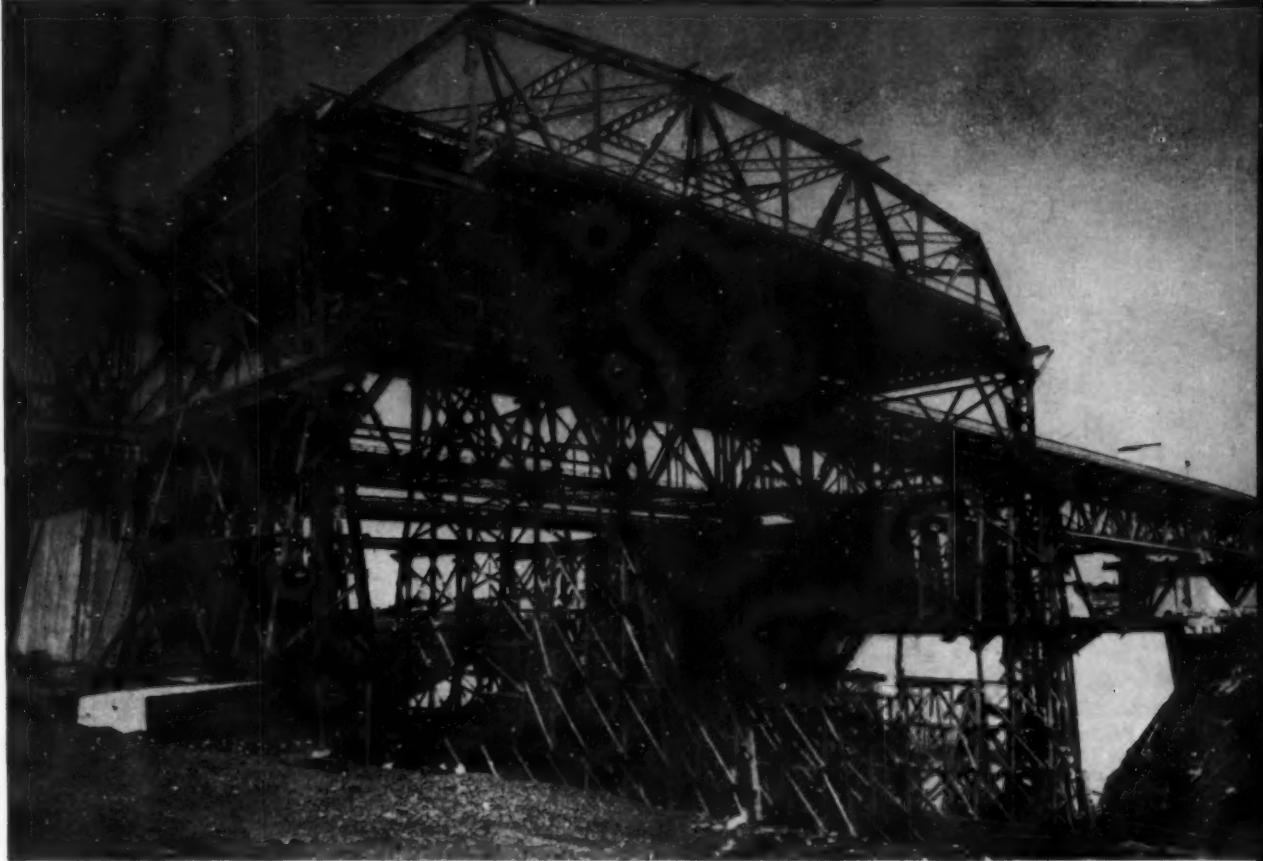
Because of the many features of practice new to the contractors and engineers, this job involved some difficulties, and a mechanical bump-remover came into play at some spots. However, according to the district engineer the operation here described is expected to secure the smoothness required by California specifications.

Curing and joint sawing were performed by A. R. Reid, of San Francisco, a specialist subcontractor. Contraction joints 2 in. deep were cut at 30-ft. intervals on the first pass, the machine then dropping back to saw the intermediate 15-ft. joints. For this work a 4-bladed Jointmaster was used. Following the transverse joint cutting,

a single-blade saw cut the longitudinal joint over the tie bars, which were spaced at 20-in. intervals as the only reinforcement in the slab.

To finish the project bituminous hot-mix was specified to be placed in the 4-ft. median strip and on the 4-ft. shoulders, this work being done by Granite Construction Company, Watsonville, California. The median is designed flush with the pavement so as not to interfere with snow plowing. No curbs were specified, for the same reason, except for bituminous dams on the shoulder edges on some high fills.

● *Job Personnel.* William Appel, was project superintendent for Gordon H. Ball & Co., and Shirley Craig general superintendent for Gibbons & Reed, Inc. John C. Peterson was resident engineer for the California division of highways, under Alan S. Hart, district engineer at Marysville. G. T. McCoy is state highway engineer.



• General view from upstream side showing new 248-ft. through truss span mounted on trestle runways ready for "translation," laterally into position in place of existing deck truss.

UNIQUE SEAWAY PROJECT

Largest Bridge Raising Job

Thirty 400 and 500 ton jacks were used in carefully planned procedure for raising large trusses a maximum of 50 feet.

A REMARKABLE bridge raising job, believed the largest ever, was completed during the 1958 season. Required to give clearance for ships which will use the St. Lawrence Seaway Canal, the project was for raising the southern end of Jacques Cartier Bridge and replacing one span. This structure crosses the St. Lawrence at Montreal.

Dominion Bridge Co., Ltd., of Lachine, Quebec, had the \$7 million contract. Design for the raising was by Dr. P. L. Pratley, consulting engineer for the St. Lawrence Seaway Authority and design-

er of the bridge in 1929.

The project involved increasing the clearance of the tenth span from the south shore by 80 ft. Fifty feet of this was obtained by raising the structure, as shown on the accompanying profile. The remainder was accomplished by replacing the deck span with a through span.

A special problem governing the planning was the necessity of maintaining vehicular and pedestrian traffic at all times. Once started, raising was a continuous operation for the various spans, bringing them up to a new roadway grade

set at 4.2 percent maximum.

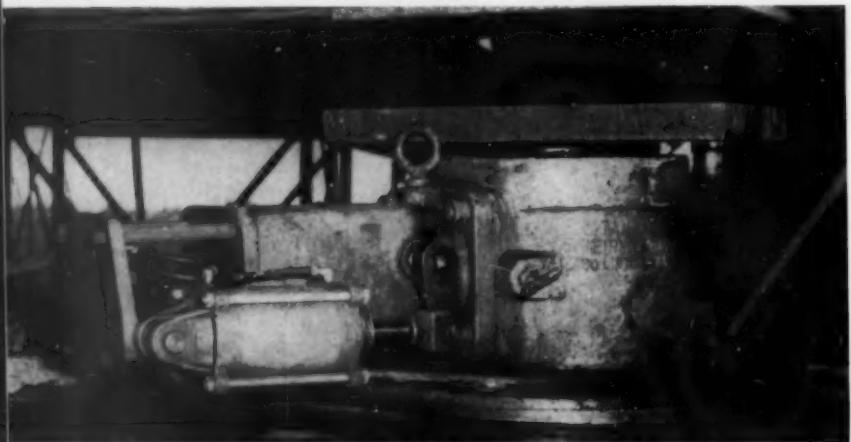
• **Bailey Bridge Bypasses at South End:** To permit increase of the roadway grade elevation at the south abutment, traffic was diverted on two lanes of Bailey bridging on each side of the third span to the South Shore. The Bailey bridging and turn-off platform at Span 3 were supported on structural steel framework.

While traffic used the Bailey bridge bypasses, Spans 1 and 2 were lifted so that the north end of Span 2 remains at its present elevation on Pier 2, and the south end of Span 1 reaches its final elevation at Abutment zero. During this stage of jacking, the first pier was increased in height about 13 ft. and Abutment Zero completed.

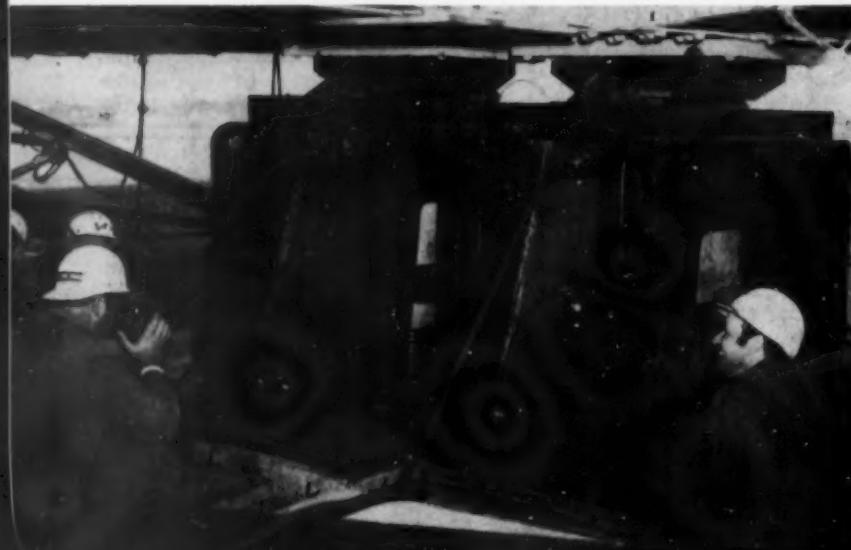
About 68 ft. south of Abutment



● Preliminary jacking operation. Rising spans 1 and 2 by means of 450 and 500 long-tons capacity motor-driven jacks. (Dominion Bridge Co., Ltd. photo.)



● 200-ton hydraulic (oil) air-operated climbing jacks at Cartier Bridge.



Zero and on the bridge centerline a new abutment was constructed, as the additional fill could not be supported by the present abutment. A 65-ft. deck plate girder span was erected between the two abutments. The roadway south of the new abutment was constructed on fill. The main bridge roadway was then opened to traffic and the Bailey bridges and turn-off removed. The traffic began traveling up a 4.2 percent grade on the fill and 65 ft. span, then down at about 7.5 percent to the initial bridge grade at Pier 2.

● **Jacking Operations:** The main jacking job was carried out in a series of stages listed here.

The second completed the jacking on Span 14 and brought Span 10 to a horizontal position about 10 ft. above its initial elevation ready for translation of the new through span. Also during the second stage, a vertical casement curve was constructed in the roadway of Pier 14.

The third stage completed the jacking on Spans 1 to 5.

The final stage raised Span 10 to its final height, giving the 120 ft. clearance required.

The jacking job was done by 18-500 long-ton jacks, and 12-400 long-ton jacks. Heavy steel weldments ("climbing jacks") were used in place of pier members. A span end was lifted by the jacking girder, and the climbing jack replaced the bridge pier member. The climbing jacks consisted of three bearing surfaces, the central being on a pad on the ram of the hydraulic jack.

The main jacking operation was as follows: pressure was admitted to the hydraulic jack, thus lifting the bridge and outer pads of the climbing jack, 6 in. Precast concrete blocks were then placed under the two outer pads of each climbing jack. The hydraulic jack was fleeted and a concrete block placed under its bearing pad, thus the span was raised 6 in. and the operation ready to be repeated. All four jacking points on one pier were raised 6 in. and then a similar operation was carried out on another pier.

When the bridge over any pier had been raised by 2 ft. (i.e. four blocks), a course of pier concrete was poured. When the bridge road grade is at its final elevation, the climbing jack was replaced by a precast pier capping block and the original bridge pier member.

(Continued on page 86)

● **560-ton climbing jacks in operation.**

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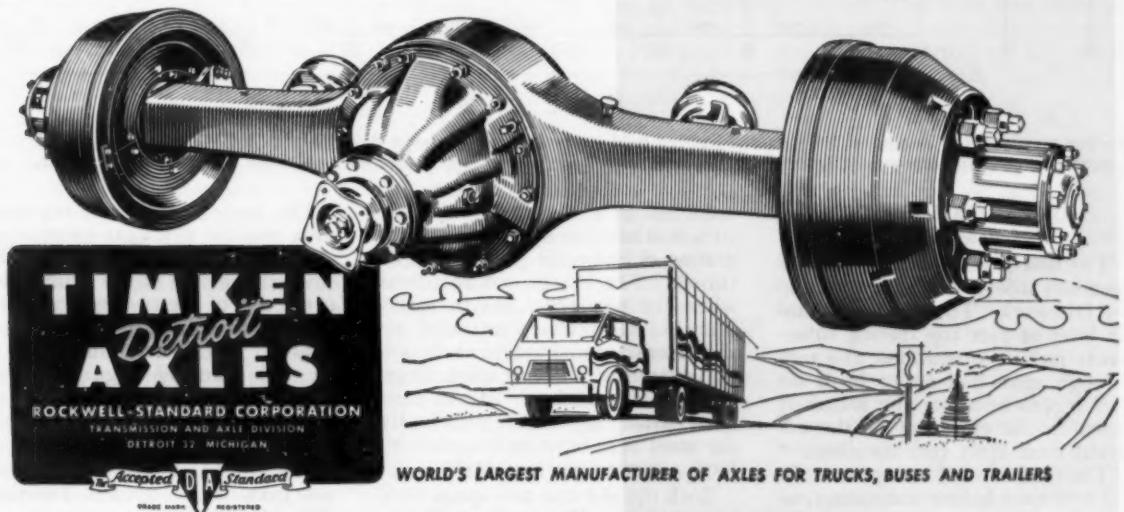
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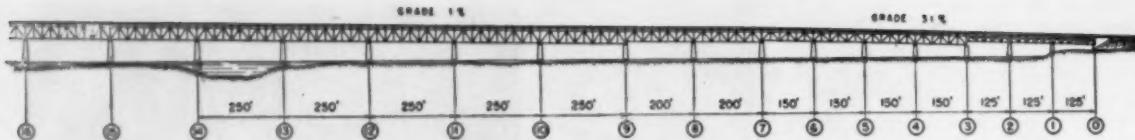
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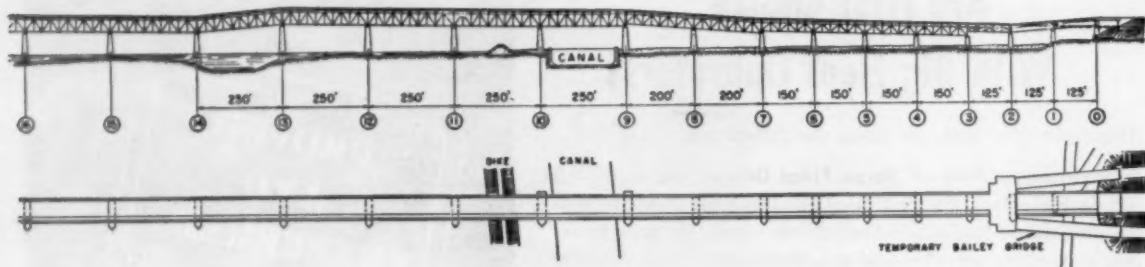


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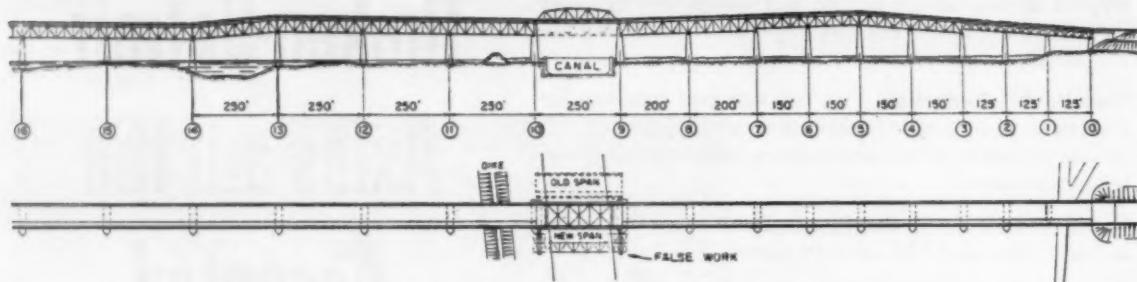
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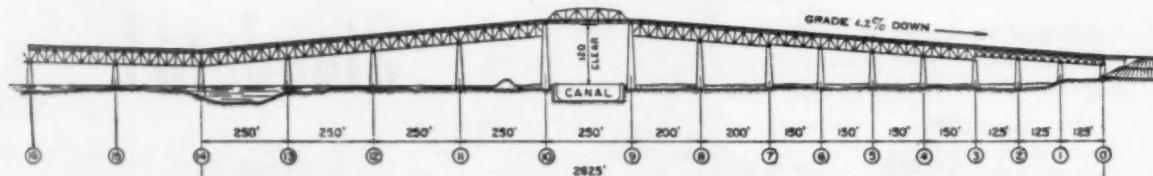
EXISTING SOUTH APPROACH



FIRST STAGE OF JACKING



SECOND STAGE OF JACKING AND REPLACEMENT OF CANAL SPAN



FINAL STAGE

- Four stages in the raising of the Jacques Cartier Bridge, during which also a Bailey bridge bypass was constructed near one end, and one span (No. 10) was replaced after partial raising, by a deck-type truss for channel clearance.

Erection and Translation of New Span 10

The new span was erected on the upstream side of the bridge on timber falsework. To maintain a single level of pier top during subsequent jacking operations, the new through span had to be built on steel legs to bring its pier members down to the elevation of the adjacent deck span pier members.

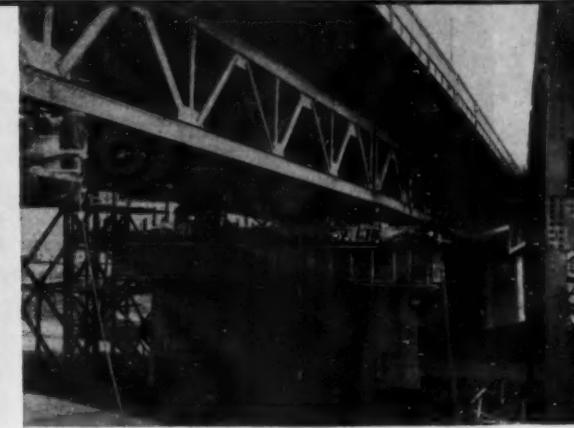
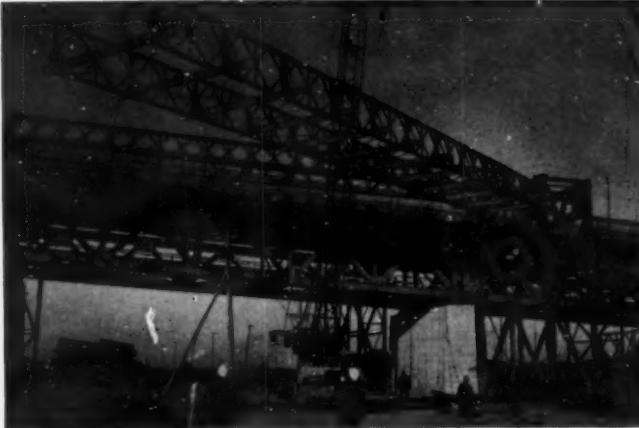
The roadway slab was poured on the new span before translation, so that it could be opened to traffic as soon as it was placed on the main bridge centerline. Traffic was stopped while both the new and

old spans 10 were rolled in a downstream direction by repetitive operation of hydraulic jacks with 4 ft. runout. The bridge was reopened when the new span was in place. The old span was dismantled on the downstream side and the channel cleared of all false work. Stage Four jacking of Span 10 was then done while on steel legs. Finally the steel legs were surrounded by large concrete pier pedestals.

Both the old and new spans were mounted on roller trucks, each containing 42 6 in. diameter rollers. The trucks in turn rested on the runways.

The force to move the old span away and the new span in position was by hydraulic jacks. On the downstream side of the bridge and at the end of the two runways, two double-acting hydraulic jacks were located. These were connected to the old span by large plate-link chains. The jacks had a combined capacity of 500 tons and a stroke of 4 ft.

The total weight of the old and new spans was 3,100 tons. The time allowed for this operation was 7 hours and for this period (from 5 a.m. to 12 noon) the bridge was closed to traffic. When the jacks



• (Left): Bailey bridge units being erected to bypass traffic. (Right): Jacking under way during raising of Jacques Cartier Bridge. (Dominion Bridge Co., Ltd., photo.)

had done their work (late in 1957) and the last link was removed—traffic rolled once more along one of Montreal's important arteries.

1. *Personnel.* During the translation, men from Hydro-Quebec and the Bell Telephone Co. were present to correct possible faults in the utility line.

Besides the crews of ironworkers, the following contractor personnel were required with spare men available for emergency or relief periods:

A. Field superintendent Vernon Carr and project engineer Ross Chamberlain were in charge. No control man or jack operator could leave his position without permission.

B. The control engineer B (Al Francis) was in charge of jacking and translation control. His duties were

a. To advise his assistants C1 and C2 to commence jacking.

b. To observe the target rods and issue the necessary instructions to C1 and C2.

c. To see that during the fleeting stroke the instructions were relayed promptly to E to F to C to O.

d. To suspend operations in the event of unexpected difficulties with respect to the alignment of the spans on the runways. In such an event, he was to consult the project engineering before renewing jacking.

e. He had at all times to have an assistant B1 to aid in receiving and sending messages, etc.

C. The duties of control men C1 and C2 were to transmit promptly and accurately instructions from B to Jack Operator 01 and 02, and to see that such instructions were promptly carried out. Their communication with B was limited to, 1, acknowledging the order, 2, that the order was put into effect, 3, that trouble developed which prevents the order from being carried out.



• Control panel for operating 450 and 500 long-tons capacity motor-driven jacks. (Dominion Bridge Co., Ltd., photo.)

D. There were two jack operators, 01 and 02 who were held responsible for jacking equipment. The operators immediately followed the instructions from control men C1 and C2 and reported any difficulties to C1 and C2 for relay to B.

E. Control men E1 and E2 were stationed beside the jacks and were in contract with F1 and F2. Their duties were as follows:

a. To observe the jack travel and to relay the information to their respective partners F1 or F2 at about half-inch intervals.

b. To issue instructions to 01 or 02 by way of F and C for the fleeting stroke and removal of links.

c. To relay messages from G1 or G2 through F1 or F2 to B.

F. Control men F1 and 2 are responsible for the following duties.

a. Recording the progress, as stated by E1 or E2, on the target rods.

b. During the fleeting operations they were to relay promptly and accurately the information from E to C.

c. In case of difficulty, they had to relay messages from G through E to B.

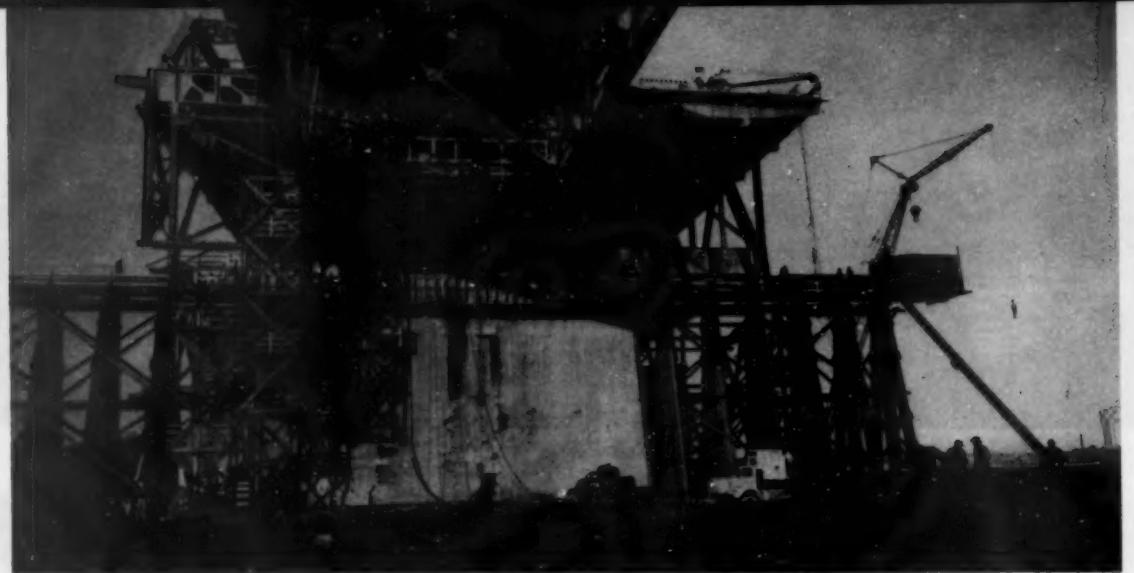
G. Control men G1 and G2 had access to the whole runway. They saw that each runway was equipped with wedges, grease guns, and a flashlight for inspecting rollers. There was a crew of four men on each runway under the direction of G1 or G2. One man was stationed at each roller truck. Any abnormalities were reported by G1 or G2 through E to F to B. Their duties were as follows:

a. To wedge the upstream side of the extreme downstream roller next at the end of each jacking stroke to prevent any loss of travel.

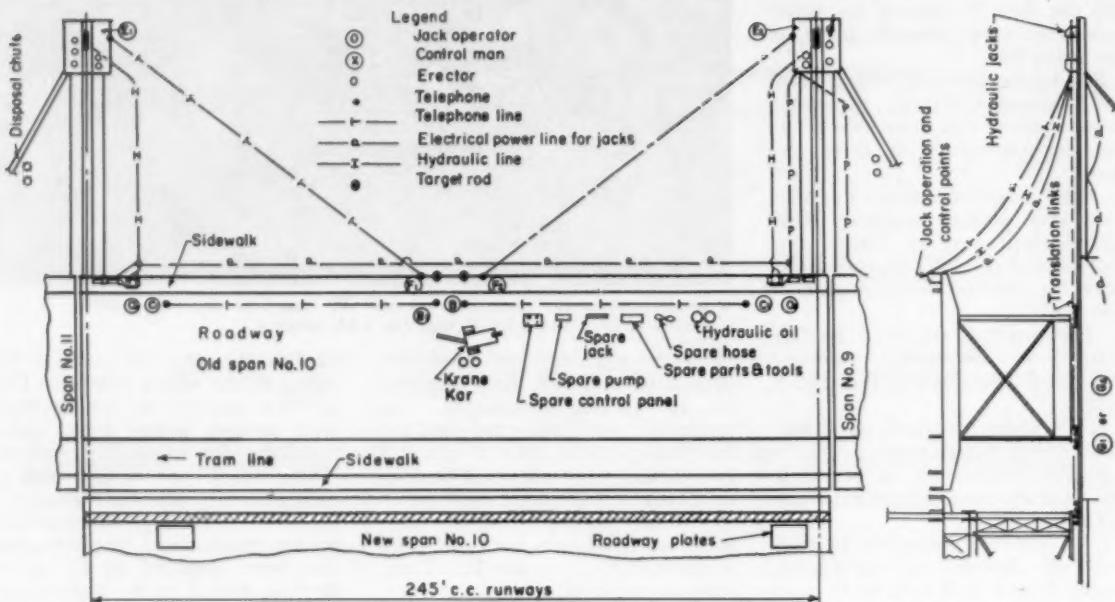
b. To observe the tracking of the roller trucks with respect to the rails and grease the trucks as needed.

c. To observe the alignment of the rails themselves while the jacking compression is acting.

2. *Jacking Cycle. Pulling Stroke.* When all was ready, control man B notified the two men C by telephone, telling the jack operators to start at full speed. Both jack control levers were put into raise on each panel, i.e., full speed on both jacks. As the jacks pull the spans,



● Showing "Translation" of span 10 partly completed. Old span is moving out to the right. (Photo courtesy St. Lawrence Seaway Authority and Dominion Bridge Co., Ltd.)



● Diagram E-454, used in the detailed procedure for rolling new span 10 into position in place of the old.

the distance traveled into any link was measured by scales at the jack rams. These readings, at about half-inch intervals, were relayed by telephone from control men E to their respective partners F who noted the information by moving a target rod on the handrail.

The chief control man B could judge the progress by watching the two target rods. If one side moves ahead of the other by about 2 in., B notified C at the fast side to tell the jack operator to reduce to half speed until the situation had been corrected. When the 4-ft. run-out of the jacks had almost been reached, B notified both men at C

who notified the operators. The operators watched the hydraulic pressures. When the pressure began to rise, signifying the end of jack travel, the jack levers were put into control return until pressure had reached zero. As a check, E notified F that the jack had reached full travel. When the hydraulic pressure was reduced to zero, the jacks were put into fast return on one lever only (half speed).

Fleeting Stroke: As the jack reached the end of its travel, the upstream pin of the link to be removed was tested for looseness. While the jack was being fleeted at half speed the pin became loose and

was removed as quickly as possible to avoid stopping the fleet travel. When the pin had been removed, or should difficulty arise, the jack operator was notified as soon as possible by E to F to C. During the fleeting operation, B gave over his telephones to the two men at F who relayed information for their respective sides directly. When the upstream pin had been removed, the jack operators put both control levers into fast return (full speed fleet). The men on the jack platforms removed the links and the downstream pin, which was re-

(Continued on page 90)

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RENT OR PURCHASE MACHINES?

(Continued from page 76)

number of hours of use per year, for which the cost of owning and renting equipment will be the same, may be developed. Because of necessary assumptions this equation should not be expected to give results which are accurate to the hour, but the results may be used as a guide.

Let P = the delivered cost of the new equipment

S = estimated salvage value at the end of its useful life

N = number of years of useful life

p = ratio of annual cost of maintenance and repairs divided by the annual cost of depreciation, based on using it 2,000 hours per year

q = a factor equal to p when the equipment is used 2,000 hours per year, but less than p if the equipment is used less than 2,000 hours per year

i = sum of the annual cost of interest, insurance, taxes, and storage, expressed as a fraction of the average value of the equipment. It is assumed to be 13 percent = 0.13

Q = factor to be multiplied by the original cost of equipment in order to obtain the average value during its useful life

The values of Q are as follows: (1)

Life in years	Q
2	0.75
3	0.67

4	0.63
5	0.60
6	0.58
7	0.57
8	0.56

C = cost per month for renting equipment, excluding the cost of fuel, lubricating, greasing, and operator's wages

$p/3$ = average cost per hour for maintenance and repair for rented equipment which must be paid by the renter

n = number of hours used per year for which the cost of owning or renting the equipment will be the same

If it is assumed that the cost of fuel, lubricating oil, greasing, and operator's wages will be the same for purchased or rented equipment, these costs may be disregarded.

The cost of owning equipment will be in accordance with the formula derivation set forth on these pages.

These analyses can be applied to any kind of equipment provided the essential information is available, and the results used as a guide in determining the best method of providing equipment for use. A careful study of the analyses, together with a knowledge of equipment costs and behavior, will enable one to make the necessary assumptions with reasonable accuracy.

(1) For more complete information on this item see Estimating Construction Costs, 2d edition, or Construction Planning, Equipment and Methods by R. L. Peurifoy, published by McGraw-Hill Book Company.

BRIDGE RAISING JOB

(Continued from page 88)

placed in the new link position as soon as possible. When the pin was about to be replaced, one lever on each control panel was put into neutral. When the new chain was pinned, the jacks were pressurized to about 500 psi and the information relayed to B who began a new cycle.

Pin and Link Removal: During the power stroke, the pin and links removed during the last cycle were chuted one by one to the ground.

Emergency Control and Final Alignment: Although spare telephone sets were available, a semaphore system was devised in case of a telephone failure.

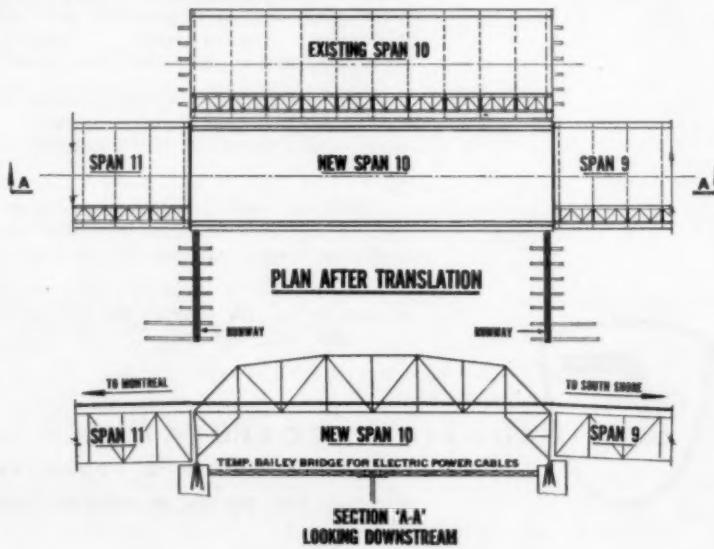
To jack the transverse girders, Dominion used a number of jack sizes, depending on the clearance. In most cases, two 285-ton jacks at the downstream side of the span did the job.

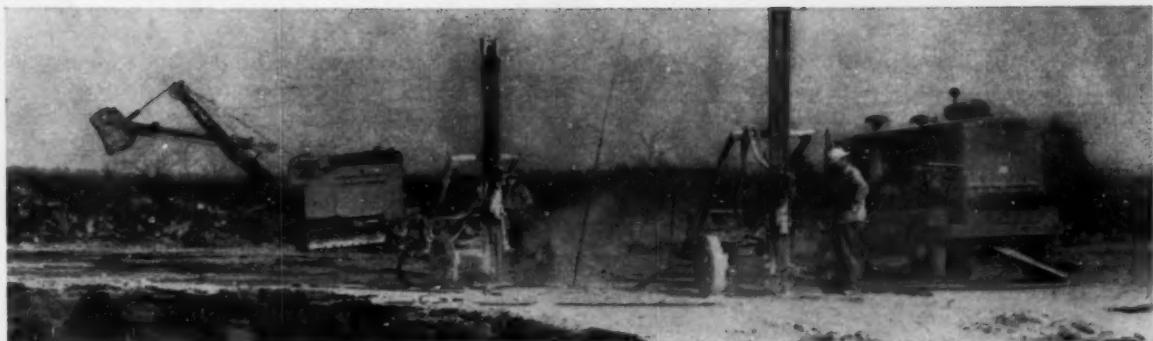
The heart of the raising operation was the climbing jack assembly. Designed by Dominion engi-

neers, it consists of a Tangye hydraulic jack centered upside down in a heavy welded steel yoke. Because jacks were interchangeable,

the contractor did the job with 50 yokes and 30 jacks. There were several types of climbing assemblies. (Continued on page 92)

• Plan and section of the Span 10 structure.





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(Continued from page 90)

bilities, depending on the size of the load. Generally, a 400-ton jack was adequate under the lighter side of the shorter trusses, but a 500-ton unit with a stronger yoke was required at most other points. All yokes were made to serve as normal truss anchorage bearings. On top, a rocker-type bearing assembly replaced the original truss shoe.

Some yokes were designed to serve only at the fixed ends of spans; others at the movable ends. The only difference was in the pads at the base of the yoke's two legs. The fixed yoke has solid steel pads, whereas the movable yoke has sliding pads. Layers of Lubrite lubricated pad surfaces to permit easy sliding when the spans expand or contract. But slotted fittings limited sliding to a few inches and kept movement under control.

Winter Maintenance Data for Ohio Turnpike

The procedure in combatting snow and ice on the Ohio Turnpike is reported as follows:

Each radio-equipped truck has a definite assignment. A maximum of effort would call for 48 two-ton trucks and 16 five-ton trucks plowing and spreading abrasives on the 236-mile road. These trucks spread abrasives and chemicals augmented by eight large motor graders plowing and scraping ice.

For 25 degrees or above, with rising temperature, salt is spread at 400 lb. per mile for snow and sleet, and at 200 lb. per mile for freezing rain.

When the temperatures below 25 degrees F. and falling, dry snow plowing only is required.

For 25 degrees F. or below, with falling temperature with snow or sleet anticipated, a "hot mix" of salt and calcium chloride is applied at 400 lb. per mile, or at 200 lb. per mile for freezing rain.

When it is 10 degrees F. or colder, plowing and spreading of abrasives proceeds at 1 cubic yard per mile for snow, sleet, freezing rain or an accumulation of snow or thick ice. Cinders, slag, or silica sand are used for abrasives under these extreme conditions.

Under all conditions the procedures are repeated until roadways are bare. More than 20,000 tons of abrasives, 12,000 tons of salt and 2,500 tons of calcium chloride were used in the 1957-1958 winter on the turnpike.

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**Cedarapids COMMANDER produces
158 tons per hour — 3/4" minus — 40% crush**

Even under tough operating conditions... producing $\frac{3}{4}$ " down; crushing 40%; handling very abrasive material... this Cedarapids Commander turned out aggregate at a profitable rate for Whitewater Sand & Gravel Company, Grand Junction, Colorado. Under other conditions, Commander Plants all over the country are producing up to 400 tons per hour, or more.

Big-volume output, with less maintenance requirements than most smaller capacity plants, is one of the many reasons why aggregate producers use more Cedarapids portable crushing plants like the Commander, Challenger, Junior Tandem, or Pitmaster than any other make! It's conclusive evidence that with Cedarapids you always get the low cost per ton that means a highly profitable return on your initial investment.

IOWA MANUFACTURING COMPANY
Cedar Rapids, Iowa, U. S. A.

IOWA MANUFACTURING COMPANY, Cedar Rapids, Iowa, U. S. A.
My job is _____

What Cedarapids plant will handle it most profitably?

Name _____

Company _____

Address _____

City _____ State _____

More Precast, Some Prestressed

New Mexico's Bridge Design Trend

By W. E. Strohm

Bridge Engineer, New Mexico State Highway Department
Santa Fe

Precast units for smaller structures have saved money by eliminating falsework. Prestressed concrete used in this state only for major structures justifying casting yard investment.

Although structural steel has been in plentiful supply recently, the price structure and delivery schedule of structural steel bridge members during the period of scarcity did much to stimulate increased use of reinforced concrete construction in New Mexico highway department bridges. The wide use of conventionally reinforced, precast concrete bridge members during that period led to the estab-

lishment by industry of pretensioning beds within the state and the introduction of pretensioned concrete bridge members into our work.

When it became obvious for a time that steel prices were no longer competitive and deliveries uncertain, the alternate in our area for bridge decks of short to moderate span lengths was reinforced concrete construction. For short-span

bridges on the primary and secondary systems, we prepared standard plans for:

(a) Precast concrete deck units for 25 ft. and 31 ft. span lengths, H15-S12 and H20-S16 live load capacities. These members are the inverted channel section 3 ft. wide and reinforced with standard reinforcing bars.

(b) Precast concrete girders for 40 ft. span lengths. The girders are rectangular in section 10 in. wide by 40 in. deep and conventionally reinforced. The deck slab is cast-in-place.

For grade separation structures in the interchanges on the Interstate System, we have prepared standard plans for bridge decks using conventionally reinforced precast concrete girders of a modified I section in span lengths from 36 ft. to 73 ft., with a cast-in-place concrete deck. Girders are used in Cantilever and suspended span arrangement as typically shown in the accompanying sketches.

Various types of cast-in-place concrete structures are being designed and built. These include short-span continuous reinforced concrete slab bridges for drainage crossings, and modified box girder construction for longer spans in grade separation structures. Two of such structures have recently been completed in which the use of timber falsework was avoided. The contractors constructed a compacted earth embankment of generous width on which to place and anchor plywood panels to serve as the bottom form for the concrete slab.

We have prepared a design for a short-span concrete rigid frame bridge for underpasses under Interstate highways.

The use of structural steel has at



● Precast, post-tensioned concrete bridge deck units in Rio Grande Bridge west of Alameda. Bridge consists of nineteen 50-ft. spans. Workmen shown placing precast blocks which serve to support curbs and railing posts and receive end anchorages for transverse post-tensioned units.

28-yd B Tournapull®

16-yd C Tournapull

8-yd D Tournapull



35-ton capacity B Rear-Dump

22-ton C Rear-Dump

11-ton D Rear-Dump



16-ton Bottom-Dump



10 & 20-ton Side-Dumps



436-hp Twin-C Pusher



213-hp Tournatractor®



Drawn Scrapers
(11.5, 18, 28 yd)



Sheep's Foot Rollers



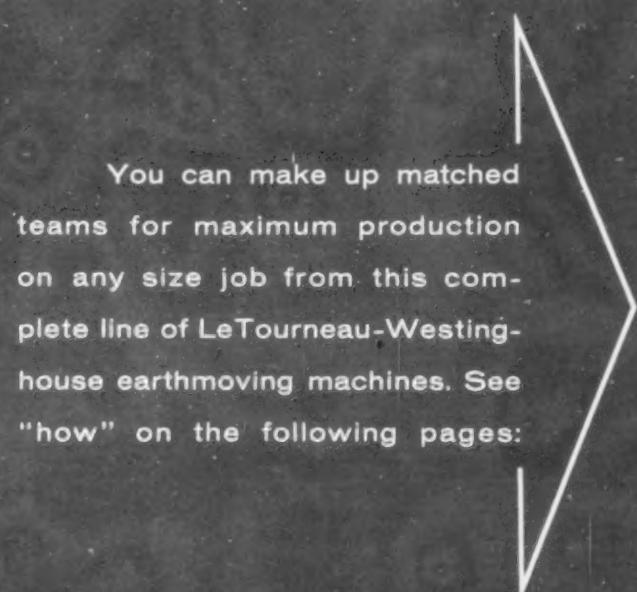
*Trademark

Model 660: 160 hp; 190 hp
with torque converter

Model 550: 128 hp; 145 hp
with torque converter

Model 440: 115 hp

Model 330: 80 hp



You can make up matched teams for maximum production on any size job from this complete line of LeTourneau-Westinghouse earthmoving machines. See "how" on the following pages:



**Choose from
three sizes of Tournapulls...**

First in the field and long "the standard of the industry", now better than ever. Choose from 335-hp, 28-*yd* capacity B 'Pull*; 226-hp, 18-*yd* "C"; or the 138-hp, 9-*yd* "D".

"B" and "C" size scrapers are of the famous fast-loading Fullpak design. Because bowl is low, dirt rolls in almost horizontally, doesn't have to be "lifted" in. Curved tailgate, crowned sidesheets, and deep apron belly keep dirt "boiling" for fewer voids, more solid "pay-pack." D 'Pull is only 8' wide, for permit-free road travel *anywhere*.

Standard on all 'Pulls is the patented power-transfer differential, which enables scrapers to keep moving in soft going. Another exclusive Tournapull advantage is fingertip electric controls... which give you the simplest and easiest-to-operate control system of all earthmoving machines.

**... Each with
interchangeable haul units**

These same famous Tournapull prime-movers also pull and power other trailing units. Most widely used of these is the well-known L-W Rear-Dump, available in 11, 22, and 35-ton capacities. With flared top, sloped sides, and low rear-entry, loading is fast and easy. Triple-layered, ribbed-steel construction assures long life. Pivot-steer allows machine to turn in less than its own length to get you up to and away from shovels and dump areas *quick*. Maintenance costs are lower because no-frame, no-spring, no-mainshaft construction *eliminates* most of the "troublemakers"! These 30 to 35-mpg off-road haulers can be purchased separately, to attach to 'Pull prime-movers you now own, or as complete combinations.

Here's how to match ...for top profit

Whether you move 200,000 yards a year or 2,000,000, you'll need to move that dirt *faster* and at *less cost* than ever before. And no matter what size contracts you handle, it will pay you to assemble "matched teams" of greatest efficiency to suit *your* production needs. So look over these improved tools in the L-W line and measure their abilities to move today's dirt faster and at lower cost.

... in the "super" production range, for instance, there is the big B Tournapull® with 28-*yd* Fullpak® scraper... the 436-hp Twin-C* pusher... and the 190-hp 660 POWER-Flow® Adams* model grader.





Select from
seven sizes of graders

Known the world over as the "quality line" of motor graders, L-W Adams graders combine more production-boosting advantages than any other make. EXAMPLES: all-welded, one-piece box frames, for greater strength, less deadweight. Rubber-mounted engines, to reduce vibration. Easy-operating controls for fast blade positioning. Best full-blade visibility. Full-floating drive-axles and anti-friction power trains. Constant-mesh transmissions with 15 speeds! And the advanced new POWER-Flow models with torque converters offer infinite gear ratios, always match power to load.

Seven sizes, ranging from 60-hp "220" to the big 190-hp POWER-Flow 660.

machines to jobs in any yardage range

... if you handle jobs that vary widely in yardage, the 18-yd "C" size "package", including the 218-hp Tournatractor[®] and the Model 550 grader, may be your answer.

... and to handle your odd jobs and clean-up duties at low cost, consider the combination of 9-yd D Tournapull and either the Model 440 or 330 grader.

Check over these combinations of LeTourneau-Westinghouse earthmoving machines. Then see your L-W Distributor. He can help you analyze your work and recommend a "package" best suited to *your* operation.



...and two FAST
rubber-tired tractors

When LeTourneau-Westinghouse put tractors on rubber tires, it brought speed and mobility to tractor operations. Result: you can get more tractor work done, in more locations, with ONE machine, than you can with two crawler-units. You drive L-W tractors around your project-area at speeds to 17.2 mph. You dispatch them like you would trucks... anywhere there's work to do.

Every spread needs at least one Tournatractor... heavy construction's only proven[®] tractor-on-rubber, with the "bugs" eliminated. This torque-converter-equipped 218-hp unit is available with all standard work-attachments, from a dozer blade to a railroad-car coupler.

Developed especially for push-loading today's big, fast scrapers is the L-W Twin-C tractor, combining 40 tons of work-weight, 20 mph speed, and 436 horsepower. Twin engines (kingpin connected for maneuverability) plus synchronized torque-converter power trains help the Twin-C develop 64,500 lbs of drawbar pull.

please turn page

Are you ready? . . .

with machines matched for
lowest-cost production?



According to the Bureau of Public Roads' latest prediction, 1959 will be the first seven-billion-dollar year in roadbuilding history. This means more work for all of us . . . but you can bet your bottom dollar that work will be more and more competitive. In order to squeeze profit out of every job, you should be equipped to work machines properly matched in power, speed, and capacity.

In the LeTourneau-Westinghouse line, you can match scrapers, pushers, dozers, and graders, to step up your yardage. Certainly it is worthwhile to call in your L-W Distributor for a careful analysis of your present equipment. Get his suggestions on how to improve the performance of your fleet by matching a few new and faster L-W earthmoving machines with the better machines in your present line-up. You will find that by trading in your older, slower machines for modern L-W tools, you can *greatly* increase your profit-potential.

Trade now... while values are still high

Used machines as well as new, are moving out of your equipment distributors' yards at an accelerated pace. There's every reason to believe that equipment demand will equal (and may even exceed) the supply. That's why it is good business to trade now . . . while the market is still "bearish" . . . and dealers are in position to give you better deals. Better make it soon!

As an L-W equipment user you're backed up by these facilities

Distributor service

— prompt, dependable, and as near as your phone. Your L-W Distributor is vitally concerned in seeing that your equipment is always in top operating condition, set for maximum production.



Field service representatives

— furnishing a direct link between you, your distributor, and the factory. Machinery experts in the construction field, they're available to team up with your distributor in getting the best from your L-W equipment.

Factory training schools

— extensive LeTourneau-Westinghouse training facilities, established to train distributor's servicemen, and to train *your own* mechanics in on-the-job service and maintenance.

And remember, your L-W Distributor is an independent businessman in your area, handling not only LeTourneau-Westinghouse machines, but other well-known and reputable brands of construction equipment. He can serve you in many ways, whether you buy equipment outright, pay for it in monthly installments, or rent. Talk to him soon!

LETOURNEAU-WESTINGHOUSE COMPANY

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company
Where quality is a habit

- Completed bridge over Rio Grande west of Alameda (shown under construction on previous page).



no time been entirely abandoned. Steel designs are used where particularly applicable. Such use will, incidentally, keep us informed concerning prices and delivery.

Precast, post-tensioned concrete bridge deck units in 50 ft. spans were used for a long bridge over the Rio Grande. And we have plans for a second prestressed concrete bridge at another location over the Rio Grande. The use of post-tensioned concrete bridge members is competitive where the number of units required in a sin-

These members afford a shallow depth of deck which results in substantial savings in embankment quantities entering into construction of the interchange ramps and structure approaches. The span lengths required for the highway grade separation structures allow these members to be used also in multiple span bridges for stream crossings, thus avoiding use of a variety of span lengths.

Prices for steel bridge railings had advanced to a point where aluminum bridge railings were

competitive in price. We are now permitting the use of aluminum railings in competition with steel.

Because of restricted deliveries, we had substituted steel pipe pile shells for steel H-section bearing piles wherever applicable. Generally these are 12½ in. O.D. by ¼ in. thick shell, filled with concrete after driving. These shells withstand hard driving. We have a moderate stock of H-section bearing piles which are loaned to contractors for use in our work where such piles are particularly applicable.

TABLE I
Design and Cost Data, New Mexico Highway Bridges

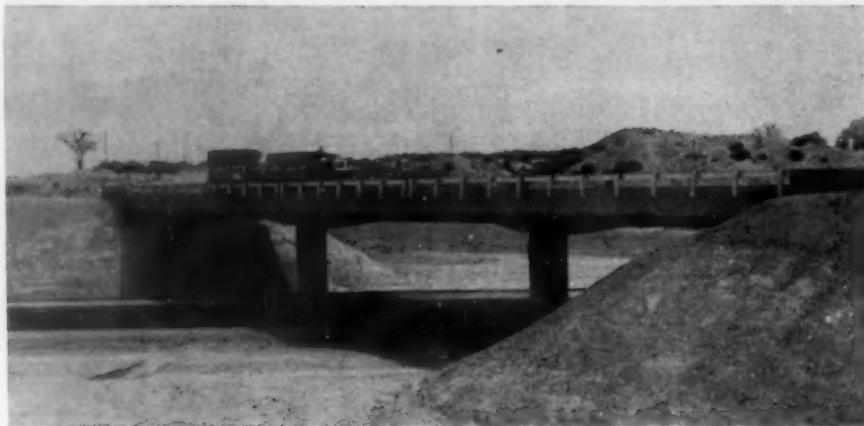
	1955		1956		1957		1958 to Sept. 1	
	No.	Cost	No.	Cost	No.	Cost	No.	Cost
Continuous steel beam span bridges with concrete deck	11	\$ 728,720	1	\$ 114,179	3	\$ 255,823	9	\$ 921,920
Continuous reinforced concrete slab bridges	3	256,518	10	1,154,972	19	1,110,487	1	58,700
Precast (not prestressed) concrete bridges	6	137,157	25	1,407,192	29	1,683,457	3	207,744
Pretensioned concrete bridges					2	344,950	11	1,132,781
Average Contract Prices:								
Structural Steel (lb.)		\$ 0.153		\$ 0.250		\$ 0.253		\$ 0.17
Reinforcing Steel (lb.)		0.133		0.15		0.148		0.14
Cast-in-place 3000-lb. Concrete (c. y.)		60.50		70.14		63.75		65.50
Precast 4000-lb. Concrete (c. y.)		96.66		106.00		103.59		105.00

gle bridge is sufficient to absorb the cost of the casting beds, curing equipment and other plant items.

In late 1957, plants were established in Albuquerque, New Mexico, and El Paso, Texas, suitable for the manufacture of pretensioned concrete bridge deck members and piling. Preliminary studies indicated that competitive prices could be expected for plant manufactured pretensioned bridge members within a haul distance of 150 miles from these plants. Standard plans for highway grade separation structures were prepared based on the use of pretensioned box girders.

- Three 40-ft. span bridge over Barranca Arroyo on U.S. 60. Precast concrete girders, cast-in-place concrete deck slab and curbs. Steel pipe piles 12½ O.D. by 0.250 shell.





● Cast-in-place concrete slab bridge in Pojoaque Interchange. Spans: 53 ft., 68 ft., 53 ft. Slab depth 37½ in. with Sonovoid openings 26½ in. Bridge on 4 degree curve in 48 degree skewed crossing.

TABLE III Comparative Costs—Short Span Bridges

Cost per Square Foot of Deck Area, Bridges Awarded to Contract,
January 1, 1958 to September 1, 1958

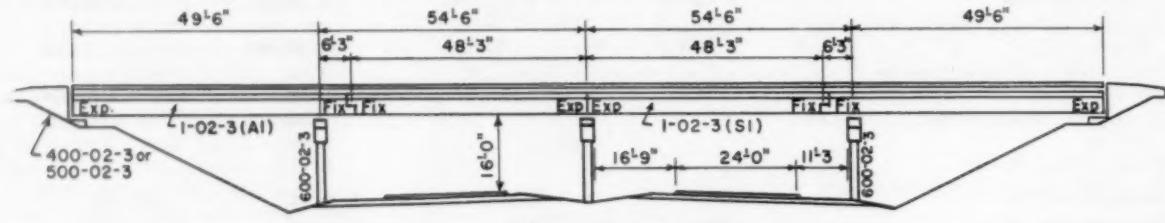
Table I illustrates the current trend in bridge construction in New Mexico Highway Department work. Table II shows comparative costs of the various types of bridges currently designed. Table III compares costs per sq. ft. for short-span bridges in 1958.

It is noted that many of the bridge engineers feel, and rightly so, that the economic type of construction should govern, inferring that no prejudice should enter into selection of bridge types. This is our feeling also. Table II shows

	Number of Bridges	COST PER SQUARE FOOT		
		Minimum	Maximum	Average
Continuous rolled steel beam span bridges with concrete deck	9	\$ 9.00	\$14.34	\$12.63
Precast concrete bridges (not prestressed)	3	11.00	11.59	11.28
Pretensioned concrete bridges	11	9.71	15.40	11.08

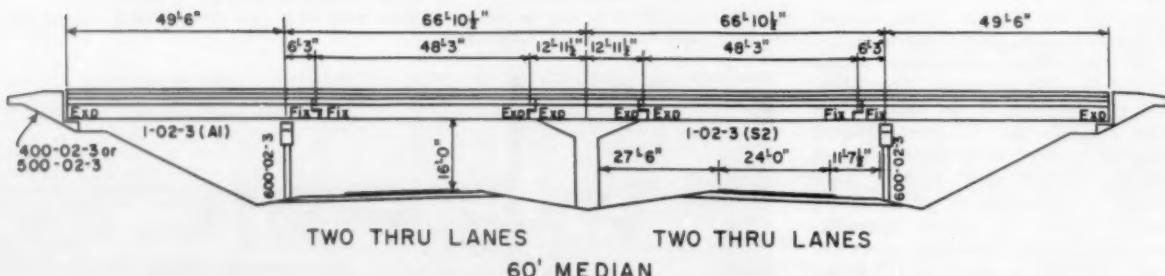
costs of various types of bridges incorporated with a substantial amount of highway construction on a project placed under contract early in 1957. This compilation in-

dicates the comparative costs for three different types of structures: two with precast concrete girders and cast-in-place decks, one con-
(Continued on page 105)



TWO THRU LANES TWO THRU LANES

36' MEDIAN



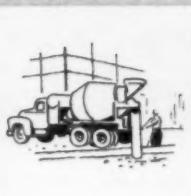
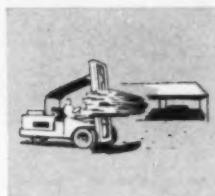
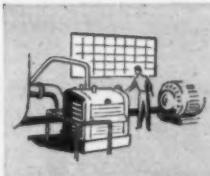
TWO THRU LANES TWO THRU LANES

60' MEDIAN

- Two of nine span schemes adopted by the New Mexico state highway department involving precast (but not prestressed) concrete girders for typical overpass and interchange structures; roadway widths 20 ft., 24 ft. and 28 ft. Loading H20-S16-44.



NOW...TEN FORD INDUSTRIAL ENGINES TO MEET YOUR POWER NEEDS!



Whatever your application, consider the many advantages you get with a Ford Industrial Engine.

Completely modern throughout, all Ford engines have Short Stroke design for increased operating economy . . . overhead-valve construction for quick, easy servicing . . . and provide more horsepower per pound of engine weight than ever before possible. To cut costs on big jobs, Ford offers 3 new Super Heavy Duty V-8's with totally new lubrication-, cooling-, and fuel-systems.

Ford Industrial Engines range from 134 to 534 cubic inches . . . including two Diesels. All are available as engine assemblies or power units, and can be fitted with Ford-approved attachments such as SAE housings, torque converters, transmissions and other equipment for special operating needs.

What's more, Ford users enjoy a minimum of downtime because there's always a Ford Dealer nearby with a complete stock of the more commonly purchased replacement parts. Yours at low Ford prices.

Get the *right* power for your application. Check Ford's full line of 4-, 6-, and V-8-cylinder engines soon.



Remember...Ford Service
is always near by!



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INDUSTRIAL ENGINE DEPARTMENT • FORD Division of FORD MOTOR COMPANY
P. O. Box 598, Dearborn, Michigan

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED!

. . . for more details circle 312 on enclosed return postal card

These are the profit-proven that lead to Payhauler® fleet

Look into the rock-lugging, grade-beating 24-ton "95"...

- **Bonus-powered**, with a 335 hp high-torque turbo charged diesel engine to beat steep grades and high altitudes with full payloads!
- **Your choice of torque converter** with powershift, or 9-speed constant mesh transmission. Speeds to match every load and road.
- **Shock-cushioning of planetary drive axles.**
- **Massive frame stamina**—with 277 lbs. of high-strength, shock-resisting steel for each rated ton of carrying capacity.

- **Springs with extra leaves and extra length** to cushion the payload, smooth the ride.
- **Positive power-steering, Torqmatic braking, panoramic vision**, for unmatched operating ease and load-speeding safety.
- **Up to 25% higher hauling speeds**—the "95" can high-ball, fully loaded, up to 38 mph.
- **Faster reverse speeds**—for spotting to load, or positioning full loads for dumping. The gear-drive "95" can travel up to 7.1 mph. in reverse.
- **9-second dumping**—another cycle-speeding feature.

...and the 250-hp, 18-ton "65" has equally outstanding features.



International® Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors... Self-Propelled Scrapers and Bottom Dump Wagons... Crawler and Rubber-Tired Loaders... Off-Highway Haulers... Diesel and Carbureted Engines... Motor Trucks... Farm Tractors and Equipment.

Power for steep grade climb-outs wins steady job for five "65's"

Bonus Turbo Charged Diesel power to deliver extra-tonnage loads up a haul road with a 17% average grade accounts for the dependence of Caldwell Engineers on five "65" Payhaulers—on the \$13 million hydro and flood-control Oliver Dam, Columbus, Ga.

Contractor doubles load delivery speed with positive Torqmatic braking!

Central Pennsylvania Quarry and Stripping Co. credits Torqmatic braking of their 5-unit "95" Payhauler fleet with doubling load delivery speed—by increasing safe downhill hauling speeds! They've compared "95's" directly to other off-road equipment on rock-hauling duty!



features ownership!

Prove what it means to command
the Payhauler ratio of power to payload—for hauling up to 25% faster; beating grades and altitude. Try Payhauler "pick-up-truck" spotting ease—"zip-around" power steering—exclusive high reverse—and all the other Payhauler advantages. See your International Construction Equipment Distributor for a demonstration!



... for more details circle 326 on enclosed return postal card

**High-percentage availability proves
inbuilt stand-up-ability!**

98.5 work availability through one measured 12-week period is the mark set by a 10-unit "95" Payhauler fleet—high-ball rock over steep High Sierra grades, on mammoth Pool Hydro Project, for Southern California Edison Co. Such records result from reserve power, reserve frame and transmission strength, and reserve shock-resistance!

**Another thirty "95" Payhaulers join
Merritt-Chapman and Scott fleet!**

Merritt-Chapman and Scott Corporation has added thirty more "95" Payhaulers to their Niagara Power project equipment spread. Now, the M-C and S Payhauler fleet totals 62 units—largest in the world! On St. Lawrence Seaway, huge Glen Canyon dam, and Niagara Power Project, M-C and S have proved rock-lugging, grade-beating Payhauler performance—and confirmed their satisfaction with repeat orders.



How a clam-action 4-In-1 gives you a one-man "equipment fleet"



Many-purpose Clamshell

Using clamshell "stand-and-load" one-gulp bucket fill, the 4-in-1 can do clean-up work twice as fast as ordinary buckets—can "surround" elusive materials without "chasing them"—can give amazing advantages on stockpile loading. "My TD-9 4-In-1 did a clean-up job in only 4 hours that usually takes any other same-sized rig 8 hours to do!" says Robert Findlay, Clarks Hill, Indiana.

Excavator-Loader



Skid-Shovel position applies the tremendous excavating force of pry-over-shoe break-out action—enables the International Drott 4-In-1 to "double" for power-shovel performance on a long list of jobs. This TD-9 4-In-1 is breaking up, digging up, and loading out old concrete walks and masonry curbings for Contractor Ralph Torres, El Paso, Texas.

"Carry-type Scraper"



As "carry-type scraper" this TD-9 4-In-1 gives inch-close lot-grading accuracy, spreads with precision. Close-coupled, this unit delivers its big capacity where "long hitched" outfits can't profitably maneuver. "The 4-In-1 gets me jobs an ordinary loader can't begin to do," states Owner Harold Swanson, Richmond, Calif. "My competitors are buying 4-In-1's to equal what I can do."

Earth-rolling Bulldozer



Lift the clam lip hydraulically, and you've got earth-rolling bulldozer action, seconds-fast and fingertip easy. This TD-20 4-In-1 is doing all the excavating and rough grading for a new 6-acre factory. "I switched to the TD-20 outfit to get maximum volume as a one-man-operating contractor," reports Owner Albert George Gee, Cedar Rapids, Iowa.

Count the machines an International Drott 4-In-1 can replace for you—count the thousands of dollars it can save you—count the profitable jobs it can get you, competing with contractors who bid on the basis of using a yard full of limited-duty rigs. And measure the performance protection value of exclusive shock-swallowing Hydro-Spring. See your International Drott Distributor for a demonstration!

... for more details circle 327 on enclosed return postal card

104

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin



**INTERNATIONAL®
DROTT**

ROADS AND STREETS, February, 1959

New ASCE Manual Issued on Private Engineering

A greatly improved and expanded manual on the "Private Practice of Civil Engineering for the Use of Engineers and Clients" is being published by the American Society of Civil Engineers.

Prepared by the Society's Committee on Professional Practice and approved by the Board of Direction, the new Manual 38 is a replacement of Manual 29 in use since 1951.

In developing the new manual, the committee had the collaboration of the American Road Builders Association, the American Association of State Highway Officials, the office of the Federal Highway Administrator, and the Bureau of Public Roads. Thus the manual is considered an exceptionally authoritative guide for all civil engineers in private practice.

An innovation is a chapter on "Suggested Fees for Professional Engineering Services on Freeway Projects," together with a curve which shows median fees for minimum professional services on rural freeway projects as a percentage of net construction cost as well as a fee chart for adjusting services as required.

Other subjects covered included the following: How to negotiate for the services of an engineer; what services the engineer is expected to render; what to include in the contract between engineer and client; a description of eight commonly accepted bases for making charges; a discussion of the usual overhead expenses of an engineer's office; method of estimating fees; the work covered by fees taken from the fee curve; how to arrive at the total cost of a project.

Charges for professional services, the manual points out, may be based on one of the following methods or combination of methods: Percentage of costs; fixed-lump sum; cost-plus-a-fixed fee; direct salary cost times a factor plus incurred expense; per-diem or hourly rates; retainer fee; or retainer plus per-diem.

Each of these methods has special application, and is detailed in the new manual, together with an explanation of the payments ordinarily made in addition to the percentage fee.

Referring to the fee curve, the manual states that the median fees shown are for engineering practice

within the continental United States. The median fees differ from those in Manual 29, being slightly lower at \$100,000 of construction cost, and slightly higher at \$1,000,000. Also the fee curve has been extended from \$2,000,000 to \$100,000,000.

The manual re-emphasizes that it is a violation of the Society's Code of Ethics to invite proposals or state a price for engineering services on a competitive-price basis. It states that "engineering service on a contingent basis is considered unsound and an unethical business practice."

Double Storm Drain Tied to Foundation

An unusual storm drain design was involved recently in improvement work at Idlewild Airport, New York. Constructed for the Port of New York Authority by Hendrickson Bros., Inc., of Valley Stream, N. Y., the drain consisted of twin 60-in. concrete pipes.

This line discharges into an outfall leading into a tidal basin. Because of local subsurface conditions, considerable well-pointing and mud-hogging had to be performed during the entire operation.

The accompanying picture is by courtesy of Ferdinand Hoefner, an official with Hendrickson Bros., Inc., which firm installed nearly a mile

● Galvanized wrought iron rods will bond these pipes against shifting ground in tidal area under Idlewild Airport.



PRECAST BRIDGES

(Continued from page 100)

sisting of continuous reinforced concrete slab deck on cast-in-place concrete pile substructure, and one of continuous steel beams with cast-in-place concrete deck on concrete piers and spill-through abutments. The cost comparisons include the low bid on the bridge, the average of all bids, and the contract cost. This indicates that the precast concrete spans, in the lengths in which they are used in this project, are entirely competitive with the continuous steel beam spans.

The use of standard plans will conserve the time of our design engineers to a limited extent—depending upon how frequently such plans can be used in the over-all highway design.

of storm drains in its recent million-dollar contract.

At the outfall end of the drain system an earth dam was constructed to permit sinking of 20-ft. piles at 6-ft. centers on which the last 90 ft. of a concrete cradle would rest. This particular cradle is 2 ft. thick and 360 ft. long. The twin pipes are permanently lashed to the cradle by 1 1/4-in. galvanized wrought iron rods.

The picture of this drain which were taken on September 5 reflects the status at that moment. A week later this area had been completely backfilled and the subsurface being readied for application of paving heavy enough to withstand the weight of intercontinental planes.



• The conveyor was an effective means of placing concrete, clear to the top of the slope, where headroom limitation would have hampered a crane.



• Showing the swiveling chute depositing concrete. The belt frame also was swiveled to various positions.

Swiveling Conveyor Helps Pour Underpass Slopes

A KANSAS CITY (Mo.) contractor with an eye on the large amount of structural work in urban highway jobs coming up, has successfully tested out a swivel-wheel conveyor for placing revetment and retaining wall concrete.

The contractor is J. A. Tobin Construction Co. Two applications of this portable belt conveyor which worked to good advantage are pictured here.

One is the placement of concrete for slope revetments under an over-

pass deck. Missouri state highway specifications call for the revetments to be poured in alternate pads with $\frac{1}{4}$ -in. expansion joints placed 8 ft. apart in checker board fashion. The pads were poured alternately. The spout on the conveyor rotated a full 360 degrees, facilitating the pouring of four slabs from a single position. Concrete used on these pads had $1\frac{1}{2}$ -in. slump. This necessitated some shoveling, which was reduced to a minimum, however, by the conveyor method.

• The same conveyor placing ready-mix for a highway retaining wall.

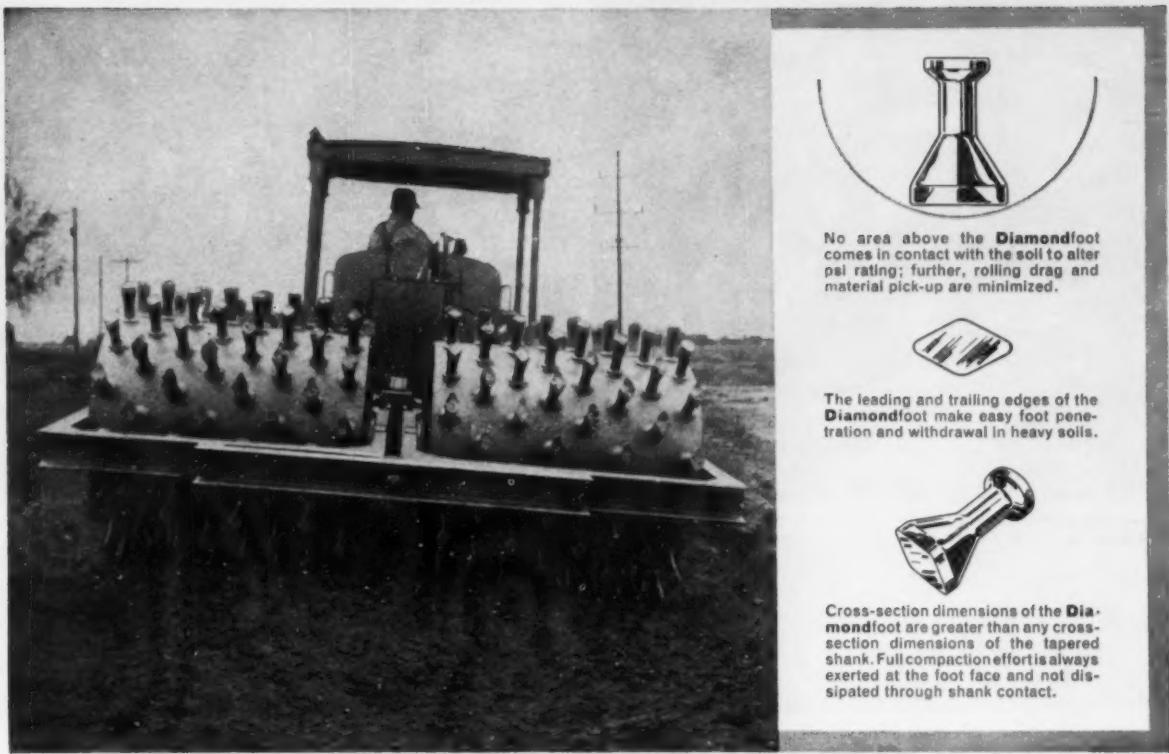


In this pour, done with highway department approval, no separation of aggregates was evident. Encouraged by the saving in labor time, Tobin's organization also secured permission to place ready-mix concrete for retaining walls by this method. Also it was used to pour grout for riprap for bridge revetments.

The low slump concrete necessary raised the question of flow from the spout at the crest of the revetment, where the spout was pointed at a high angle due to lack of clearance under the deck to raise the belt. Concrete had to be coaxed along by hand at this point, in shoveling it a few feet in order to reach the marginal edges of the pad. Even so, the placing of the concrete was at a much more rapid rate than methods previously used. The flat deck at the crest of the revetment, 40' x 4', was placed in approximately one hour with a minimum of laborers required.

The 40 ft. conveyor was placed with the trough and belt between the bridge piers, and was swiveled to right or left to give quicker access to the point of pour. By means of two 3 x 12 timbers the conveyor could be moved to within a few feet of the discharge point. The ramp allowed the undercarriage to straddle the lower drainage channel. As the pour proceeded down grade, the conveyor was easily towed backward from the pour points. It was not necessary to relocate the conveyor into another position between the piers.

The Tobin Construction Company during 1958, had 16 highway bridges under contract in both Missouri and Kansas. Whereas, in Kansas, specifications allow the revetments to be poured in a solid slab with dummy joints. They plan to use the conveyor on all of the retaining walls along the freeway projects.



No area above the Diamondfoot comes in contact with the soil to alter psi rating; further, rolling drag and material pick-up are minimized.



The leading and trailing edges of the Diamondfoot make easy foot penetration and withdrawal in heavy soils.



Cross-section dimensions of the Diamondfoot are greater than any cross-section dimensions of the tapered shank. Full compaction effort is always exerted at the foot face and not dissipated through shank contact.

New BROS relief shank tamping foot provides full compaction effort and less drag

● Stress-relieved shank of the new BROS Diamondfoot design has two major advantages for earthwork compaction. Here's why:

First; to produce the lbs. per sq. in. foot pressure required by subgrade sheepsfoot rolling specifications, the BROS design permits the *full compaction force* of the roller drum to be exerted at the *bottom* of the foot—and not dissipated by shank contact with the soil materials. **That's because the Diamondfoot has a larger cross-section than any cross-section of the reverse tapering shank.**

Second; this design minimizes rolling drag because in penetration and withdrawal, the

Diamondfoot edge design provides the least disturbance to the soil. Too, by reverse tapering, the shank is load relieved and the heavy soil materials have little chance to cling.

Other important features of this engineered Diamondfoot Roller include: Unitized drum and axle; non-adjusting, sealed, self-aligning ball bearings, *outside mounted*. Adjustable and reversible cleaner teeth provide extra long service life.

BROS Diamondfoot Rollers range in sizes from 133 psi to 724 psi foot pressures. Your nearest BROS Dealer has all the details. Or write us. Worldwide sales and service.



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Write today for the full report on the Ohio tests and for complete new literature describing the new BROS SP-730 pneumatic roller. It's free of cost or obligation!



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ROLLERS

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Michigan consistently heaps 14 pay yards in 30 to 50 seconds. Material here—and on most of Perrin's 592,000 yd contract—is blue shale-sandstone.



Power-shift and torque converter permit instant shock-free speed changes, so important for saving time on a hilly job like this.

Normal shoot and shovel job turned over to Michigan Scrapers

19 yd pans loaded in shale-sandstone by ripper-dozer.

Load time: 30 seconds

Try digging your heel into the tight shale-sandstone terrain on this 11-mile Highway 54 relocation job east of Owensboro, Kentucky—and you'd say the soil was tough enough to shoot. But a cost-conscious dirtmover—Perrin Construction Co of Cynthiana, Ky.—decided to tear it up with ripper-mounted dozers, then load with high-powered scrapers. A gamble? Perhaps. But Perrin held a pair of aces—two 262 hp, 19 yd Model 210 Michigan Scrapers.

14 pay yards per trip

First step in moving the rocky material was for the ripper-equipped 200 hp dozer to slice through the borrow area. Only one or two passes were needed to break the shale-sandstone sufficiently for the Michigans—which were then pusher-loaded. Load times, with 200 hp pusher,

ran from 30 to 50 seconds. Loads weighed out at 14 pay yards. Cycles were fast . . . so fast, in fact, that on hauls of less than 1,000 feet, it took both the big pusher and a 141 hp tractor to both rip and keep up with the two Model 210's. The smaller pusher, too, needed less than a minute to heap the Michigans.

14 trips per hour

In a typical three-shift period, over typical 2,000 foot one-way hauls, the two Michigans moved 10,000 pay yards. Each machine chalked up about 200 pay yards per 50-minute hour—making 14 to 15 trips over the 4000 ft cycle. Haul speeds averaged 20 mph.

Much less tire wear

According to Mr. Perrin, "The Michigans had no trouble picking up the shale. They have lots of power and payload capacity. We especially like their torque converter drive for this rough material work. It reduces wheel spin and

tire wear. With ordinary scrapers, you know, an impatient operator could grind up the drive tires within a month."

Demonstrations now available

We'd welcome the opportunity to show you how Michigan's power shift-torque converter drive, high ratio of hp to weight, and its high capacity (three sizes: 10½, 19, 29 yards) all can combine to boost your production and efficiency. Call us for a demonstration—soon—before you bid your next job.

Michigan is a registered trademark of

CLARK EQUIPMENT COMPANY
Construction Machinery Division

2497 Pipestone Road
Benton Harbor 5, Michigan

In Canada:
Canadian Clark, Ltd.,
St. Thomas, Ontario

CLARK
EQUIPMENT



By making initial hilltop cuts 25 to 35 ft wide, yet full specified depth, contractor eliminates need for test borings. Cross-sections thus uncovered reveal types of material, permitting borrow of bulk of hill depending on needs. Select soil is saved for top two feet of road base.

Michigan makes non-stop U-turn well within 44 ft wide roadbed. Rig also U-turns without backup in narrow 33 ft cuts.





*Replaces two crawlers and a compactor
with one Michigan . . . ups output 50% . . .*

Cuts compaction costs \$15 per hour

By buying a machine with a "built-in bonus," a midwest roadbuilder is saving at least \$15 per operating hour.

Tri-County Trucking Company of Detroit subbed the sand sub-base and all aggregate haul—about 500,000 yards—from Holloway Construction Co., Livonia, Mich., on a 9-mile leg of new Interstate Highway 23 north of Toledo. The sub-contractor knew he'd be pushing a

lot of sand fill, so he got to thinking. Sand is hard on crawler tracks—so why not use a heavyweight rubber-tired dozer. "Perhaps it would also give us some compaction—and maybe we could reach compaction specs with less rollers," wrote Boyce Grubb, Treasurer.

What happened exceeded even these thoughts.

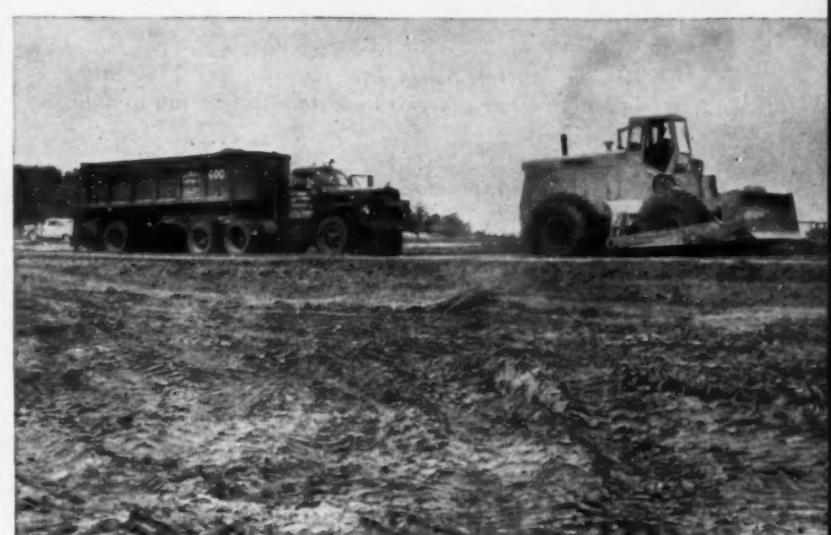
Tri-County brought out a 262 hp,

51,000 lb Michigan Model 280 Dozer. Each 26.5-25 tire was hydroflated with calcium chloride solution—1,750 lbs per tire. Rig was put to work two shifts per day, 6 days per week.

It soon proved fast enough and mobile enough to easily spread the sand delivered by 35 ton to seventeen-yard trucks and semi-trailers. Its output averaged 3,000 bank yards (per government cross-



To make load roll faster, George White (a dozer operator since 1934) hydraulically pivots blade slightly forward. Forward pitch of blade also provides smoother grade.



In demonstration of its tractive power, 262 hp Michigan pulls fully-loaded 17-yd dump truck through soft sand fill at site of temporary road.

section) per 10-hour shift. (In contrast, a 35,000 lb crawler, used elsewhere on the 9 mile job, regularly spread 2,000 yards per shift. Completed lifts in both cases averaged 9 to 12 inches deep). But there was an unexpected bonus, too . . .

97% Proctor in 2 to 4 passes

The Michigan, working alone, effectively met compaction specs of 95% Proctor. In fact, government tests showed 97% average compaction. Much of the time, the Michigan got these results simply in normal spreading. But when truck deliveries slumped off, the big rig ran back and forth in 200 ft lengths over the freshly-spread fill. This extra pass or two—a total of three to four passes, including passes made to spread—did the job. No specialized compaction equipment was needed. Thus, says Mr. Grubb,

"we eliminated expected use of a tractor-drawn 25 ton roller which, we estimate would have cost us at least \$15 per operating hour."

There were other savings too!

Grades within inches

1 Michigan's low-pressure tires and rear wheel steer did not tear up fill as other dozers often do!

2 The Michigan alone graded to within a few inches of final specs. According to Supt Tom Quaine, the fill thus required only touchup with a grader.

3 Michigan's 28 mph "go-anywhere" mobility enabled it to move from one end of the grade to another, 9 miles, in 30 minutes or less.

4 Tires, rolling over the sand, instead of grinding in it, saved much of the repair and greasing time needed with

each crawler, according to Mr. Quaine.

You can check these savings first hand on your job. Just call your Michigan Distributor for a no-obligation demonstration. Four size Michigan Dozers to choose from . . . 165, 262, 375, or 600 hp . . . all available on pay-as-you-profit lease-purchase and other attractive plans.

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● A 12-inch under-truck screw conveyor sends hydrated lime to dump trucks at ton-a-minute rate.

LIME STABILIZED SUBGRADE FOR KANSAS "I" PROJECT

Soil with objectionable swell characteristics treated as part of concrete-paved Interstate project 15½ miles in length—state's largest lime stabilization job to date.

For the purpose of promoting evenness in concrete pavement despite swelling subgrade soils, the Kansas State Highway Commission recently completed its largest lime stabilization project, totalling 15.5 miles in length. Extending along U.S. 40 relocation west of Topeka Interstate No. 70, the job required 5,350 tons of hydrated lime for 445,000 sq. yd. of stabilization. The project was actually in two parts—Federal Aid 40-89 I 01-5 (32), in Shawnee County, 9.66 miles, and 40-99 I 01-5 (33), in Waubaunsee County, 5.85 miles.

The first two lanes of this divided expressway were built in 1956, using untreated clay and silt-clay

subgrade soils. During the past 2½ years, differential soil moisture between the center and ends of the slab panels caused soil swell, which in turn warped and tilted the slabs slightly, creating high joints and a generally uneven pavement.

To prevent this condition on the new adjoining highway, three alternate construction measures were suggested.

1. Remove the top 12 in. of the objectionable swelling soil and replace with select borrow soil having low volume change (either for 26 ft. or full subgrade width).
2. Increase the granular subbase thickness from 4 in. to 10 in.
3. Stabilize the existing subgrade

soils with 5% lime to a depth of 6 in. (either for 26 ft. or full subgrade width).

After a careful study of costs and other considerations involved, it was decided to use alternate 3, stabilizing the full subgrade width of 48 ft. The bid cost, including the cost of lime and manipulation, was relatively low, amounting to 42c per sq. yd. for 6 in. of compacted depth.

A second important corrective measure concerned the rigid pavement design. Instead of spacing the joints on 30-ft. centers as was done on the first two lanes, the new slab lengths were 61½ ft., with doweled joints. To compensate for the increase in slab lengths, it was necessary, of course, to use heavier steel reinforcing mesh, i. e., 61 lb. per 100 sq. ft. instead of 44 lb.

Figure 1 shows a typical section of the new through traffic lanes,



● Indicating pulverizing action of lime following mixing pass. Lane just left of center has not received lime, whereas lane to right was mixed out with lime two days prior. Following two days of curing, the clay pulverized readily. The grader is scarifying the next lane, prior to first pulverizer pass on final mixing.

Before setting up the Topeka project, extensive laboratory tests were made to determine the reaction of lime with the clay, clay-silt and shale soils encountered on the job; also to determine the optimum amount of lime to use. Table I shows the physical constants both before and after treatment with varying amounts of lime. Note that the soils were moderately plastic (having P.I.'s of 20-30) but swelled considerably (3-9%). After lime was added, the soils showed considerable improvement, as indicated by the sharp drop in P.I. and swell. Of particular note-worthiness is Sample No. 501; 5 percent lime lowered the P.I. from 29 to 19 and the swell from 8.6 percent to 0.2 percent.

As a check on field performance, numerous samples were taken from the project during the course of construction. Table II shows that the stability of the soil was sub-



● Spreader attached to dump truck spreads lime in one pass.

TABLE I
Laboratory Test Data for Raw Soil and Lime-Soil Mixtures

Sample No.	Raw	Liquid Limit 3%L.	Liquid Limit 5%L.	7%L.	Raw	Plasticity Index 3%L.	Plasticity Index 5%L.	7%L.	Swell at Opt. Moisture Raw	Swell at Opt. Moisture 5%L.
502	49	45	43	43	27	14	9	6	4.4%	0.1%
508	46	43	42	42	25	9	7	7	4.9	0.1
512	44	37	36	36	24	10	0	4
501	56	55	54	53	29	24	19	17	8.6	0.2
503	37	43	44	44	14	13	14	13	3.7	0.4
504	29	38	38	38	7	9	7	6
506	44	39	40	40	23	10	6	5	3.5	0.0
507	49	45	43	37	27	13	9	1	4.5	..
505	45	44	40	40	24	16	7	4
511	39	46	43	44	18	19	9	9	5.2	..

stantially improved with the lime treatment; in fact, many of the tests were better than those originally developed from preliminary laboratory investigation.

Explanation of this soil improvement lies in a base exchange reaction occurring between the lime and clay particles, which causes the clay to agglomerate and become more granular and porous. Clods become mellow and pulverize readily during mixing operations. This is aptly illustrated in the accompanying job photo showing adjoining strips of treated and untreated subgrade immediately after one pass of the Seaman-Andwall Pulvimixer.

After compaction, a pozzolanic or cementing reaction occurs between the lime and free silica and

alumina in the clay, resulting in a substantial improvement in strength and stability. In effect, this reaction transforms the subgrade into an excellent working table* for supporting and construct-

ing the subbase and pavement courses.

During wet weather, especially, construction is expedited, because the subgrade tends to shed the rainfall and to dry out quickly. For

● During mixing, subgrade being sprinkled to bring moisture to optimum before compaction.



* For complete details of these two jobs, see "Construction Report on Experimental Hydrated Lime Treated Subgrade Sections," State Highway Commission of Kansas, Research Department, April, 1958.



● Mixing pass being made by the Pugimixer, leaving the material for two-day curing period.

example, nearly 4 in. of rain fell on the job during September; yet work was able to continue the next day after a rain. In fact, on one occasion, in October, a 3-in. rain hit the job; and project manager, John Beuerlein, stated that his crew was able to resume paving operations at least 24 hours sooner because the subgrade had been stabilized with lime. It was also unnecessary to reset the forms. Shaping the subgrade prior to placing the subbase course was also facilitated, since the stabilized clay did not come off in chunks, as so often happens with untreated clay. Mr. Beuerlein said it was like "slicing cheese."

● Standard Construction Procedures Utilized. Subgrade construction procedures used on the Topeka-West job involved spreading lime, preliminary mixing followed by a 48-hour curing period, remixing, compacting, followed by a 7-day damp curing period. Because the spreader truck was 6 ft. wide, the subgrade was built in 8 lanes. The procedure was to complete lanes 1-4, then 6-8, and finish with 5. Constructing the center lane last facilitated setting of construction stakes for final shaping operations.

Bulk hydrated lime, obtained from Ash Grove Lime & Portland Cement Co., was shipped in covered hopper cars and unloaded at several sidings within 4 miles of the project. The transfer to Ford F-600 dump trucks was effected by a 12 in. x 15 ft. under track screw conveyor, which discharged at truck level at a rate of about 1 ton per minute. Initially a smaller diameter screw conveyor was used, but was found to be too slow for handling the fluffy lime. Car unloading was facilitated by an air vibrator powered by a Gardner-Denver 105 cfm compressor. Four dump trucks handled the deliveries to the job,

each carrying 3.5 to 4 tons of lime, which were designed for 18,000-lb. wheel loading. The 4 in. subbase layer, also extending across the full subgrade width, consists of a pug-milled mixture of river sand and silt (P. I. 3 to 8). After water is added in the pugmill up to the optimum moisture content, the subbase material is spreader-laid and compacted in one lift. The pavement is 9 in. thick, with air-entrained concrete being used throughout (plain concrete on interchange ramps). Shoulders consist of a mechanically-stabilized crushed stone base and a single asphaltic wearing surface.

● History of Lime Stabilization in Kansas. Prior to setting up the record lime stabilization project near Topeka, the Kansas highway department had about ten years of experience with this type of base construction. Interestingly enough, the first job also took place in the Topeka area, involving a short section of flexible pavement which required frequent maintenance due to a wet clay subgrade. By stabilizing with a small amount of lime, the difficulty was overcome. Since 1948, the state maintenance force has used lime successfully on numerous patching and shoulder jobs.

In addition, several larger proj-

TABLE II
Field Test Data for Lime-Soil Mixtures

Sample No.*	Liquid Limit	Plasticity Index	% Moisture**	% Swell
802	45	11	24.2	0.2
804D	44	9	23.0	0.1
806	47	6	21.9	0.1
809D	44	4	21.0	0.1
810	42	9	24.8	0.1
812	39	6	22.0	0.0
813D	32	5	13.0	0.3
815	43	10	22.2	0.2
817	47	3	28.0	0.1
819	43	4	28.1	0.2
822	45	13	20.7	0.2
823	46	11	20.6	0.5
825	40	4	20.9	0.2
827	45	14	17.4	0.5
828	44	10	22.0	0.2
829D	46	13	23.0	0.2
831	44	7	22.3	0.2
834	43	7	23.2	0.3
836	40	7	17.0	1.5
838	30	3	25.4	0.8

*Samples without a "D" designation were undisturbed samples cut from the subgrade. From these, 4-x2-in. cores were made and placed in brass swell molds. These were loaded with normal surcharge weight and water introduced through perforated bases. The percent swell shown is the vertical displacement due to volume change at the end of 100 hours.

**Moisture content is existing moisture at time sample was cut. The four disturbed samples shown above were remolded and the indicated percent swell is from an initial moisture content equal to optimum moisture.

ects were built since 1955, totaling 16 miles in length. Two of these, in Mitchell and Nemaha Counties, involved base stabilization of high P. I. gravels for secondary roads. Two others, in Jewell and Cloud counties, involved subgrade stabilization under flexible pavement.* The latter projects indicated that lime subgrade treatment would result in reduced over-all base construction costs, primarily due to the stabilized subgrade layer becoming a part of the structural design.

The forerunner of the present Topeka job—i.e., use of lime subgrade treatment under rigid pavement—was a paving project on U.S. 36 east of Marysville, built during the spring of 1957. About 1,100 ft. of the roadway consisted of a wet swelling clay subgrade. Rather than excavate the bad clay, the highway department stabilized the in-place material with 4 percent lime.

Uniform spreading was accomplished in one pass with a Flynn belt conveyor-type spreader attached to the dump truck. Approximately 22.7 lb. per sq. yd. of lime was applied which was 5 percent of the weight of the soil. After the spreading, the lime was sprinkled lightly to alleviate dusting. Then the subgrade was scarified to full 6 in. depth with a Caterpillar grader-scarifier, followed by preliminary mixing with two self-propelled Pulvimeixers. Water was added as needed. Then the lime-soil mixture was sealed lightly with a Rosco 9-wheeled pneumatic roller, after which the subgrade cured for a minimum of 48 hours. The purpose of sealing was to shed water in the event of heavy rainfall. During this period lime's chemical action helped break the clay clods and increase the soil friability, so that final mixing with the scarifier and Pulvimeixers could be accomplished in only two passes. During final mixing water was added up to the optimum moisture content.

Compaction was accomplished in one lift, using two Essick vibrating impact rollers, operated at 3600 vibrations per minute with 1 to 2 mph travel speed. Specifications called for 95 percent of standard AASHO density which was readily attained in two passes. A pneumatic roller and grader were used in the finishing operation.

Upon completion of the compaction and finishing, the subgrade was moist-cured for 7 days, during which time equipment heavier than light pneumatic rollers was

• Ripping up the mixed subgrade layer following the two-day cure.



• Two or more pulverizer passes made after the curing period, to remix the soil when in a condition for breaking down more readily.

kept off. Sprinkling was done at frequent intervals to prevent the surface from drying out. During and after this final curing stage, the subgrade was virtually impervious to rain. Consequently, hauling of the subbase material proceeded with a minimum of delay.

Prime contractor for the project was Koss Construction Co., Des Moines, Iowa, with John Beuerlein, general manager, in charge. The lime stabilization work was subcontracted jointly by Soil-Crete Pavers, Inc., Oconomowoc, Wis., and Strickland Co., Tulsa, Okla.

with John Lemon Jr., and R. N. Strickland as job superintendents.

Key Kansas highway commission staff personnel connected with the project were R. L. Peyton, assistant state highway engineer (formerly with the research department, which helped develop lime stabilization in the state); W. K. Dinklage, engineer of construction; R. H. McMurray, division construction engineer; R. E. Elliot, resident engineer; V. R. Weathers, engineer of materials; D. L. Lacey, field soils engineer, and C. R. Fricke, laboratory soils engineer.

• Compaction of the remixed and bladed-out material is accomplished in a single pass by a vibratory steel roller, followed by a light pneumatic roller (latter not shown).





American build more road



Erected in just 5 days. How the dimensional accuracy of USS AmBridge Sectional Plate assures precision fit in the field is demonstrated in the installation of the long pipe-arch shown above. Measuring 112' long, having a 12'6" span and a 7'11" rise, this giant drainage structure was erected in just five working days by a five-man crew, plus crane.

Erected in 4 working days. Above, right: a modern highway-access bridge over railroad tracks at North Branch Maryland. There were 206 tons of steel involved—one double plate girder span of 103 feet, and two beam spans (35 feet and 75 feet). Steelwork was erected and riveted in four working days by the American Bridge construction team.

Weight and maintenance problems solved

by reflooring old bridge with



AmBridge I-Beam-Lok



The bridge over the West Branch of the Susquehanna River in Clearfield, Pa., has been in continuous use for almost a half century. Its old wooden floor has been patched and resurfaced time and time again. Finally, it was decided to completely refloor the 280' long x 17'6" wide bridge with something permanent. But, switching to another type flooring would not be a simple matter, for existing 12" stringers were too light to carry any additional weight. In fact, it was desirable to lighten the flooring dead load, rather than increase it.

The problem was solved by using 5" open-type USS I-Beam-Lok. Weighing only 18.8 psf., this modern light-weight steel flooring was erected on the old stringers *without secondary supports*...a total of 4,894 sq. ft. (92,400 lbs.) of it being required for the roadway floor. I-Beam-Lok, being steel, also greatly increased the strength of the bridge and will considerably reduce upkeep and snow-removal costs.

The reflooring was done by the High Welding Company, Lancaster, Pa., I-Beam-Lok specialists.

For further information about the advantages of I-Beam-Lok, ask for a copy of our 32-page catalog.

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Big Twin Batcher Serves Six Pavers

A one-stop twin batching plant designed to cut costs while meeting the Corps of Engineers' exacting specifications, is reported from Amarillo Air Force Base, Amarillo, Texas; T. L. James and Co., Inc., and W. R. Aldrich and Co., general contractor. On this 593,000 cu. yd. airfield paving project, schedules required simultaneous operation of two paving spreads—each spread with three dual drum pavers.

To avoid expense and time loss of separate stops for charging cement and aggregates, a high-capacity one-stop automatic batching plant of Noble design was erected. Double driveway arrangement permits two batch trucks to be loaded at the same time. The plant weighs and delivers 14 batches into two 7-compartment batch trucks in less than two minutes. Each 1.4 cu. yd. batch contains five materials—sand, $\frac{3}{4}$ -in. rock, $1\frac{1}{2}$ -in. rock, portland cement and natural cement. The

automatically controlled batcher dump cycle pre-blends cement and aggregates and eliminates requirement for separate cement compartments in batch trucks.

Two men operate this twin one-stop plant, compared to four or more men required for operating a pair of convention 2-stop or 3-stop plants.

The plant has overhead storage for 500 bbl. each of portland cement and natural cement. Ground silos provide additional storage for 3,000 bbl. of portland cement and 1,100 bbl. of natural cement. Two 550 bbl.-per-hour elevators permit handling of both types of cement simultaneously; or, through a system of selector gates either type of cement can be handled by both elevators at the same time. There is storage or 300 tons of aggregate.

On completion of this project, the plant can easily be divided into two separate and complete plants for future projects.

- Concrete batch plant loads two 7-compartment batch haulers at once.



Open Campaign to Halt Underground Damage

A Los Angeles group has started on a campaign to instruct contractors and excavators in the area on the need for a reduction in damages to underground structural installations.

A recent meeting of a Los Angeles substructure damage subcommittee spotted aspects of this problem. With attendance by city and county officials, representatives of contractors' associations and major utilities in the region, the group considered the rising rate of damage to storm drains, sewers, gas and oil lines and power and telephone conduits. It announced as its first step the publication of a booklet entitled *Substructure Damage Prevention*.

It was revealed that one major Los Angeles utility company suffered 1,800 instances of known damage—with \$117,000 in resultant repair costs—on its underground facilities in one year. Subcommittee chairman S. B. Birch, Jr., of the contract administration bureau of the Los Angeles department of public works, said that, besides the usual network of public utility underground installations, the Los Angeles area is traversed by many miles of petroleum pipelines. Since these lines carry inflammable products, and since damage to any of the others would create hazardous conditions, he added, it is obvious that excavators must take every precaution when working in the vicinity of such substructures.

The booklet details step-by-step recommended standard field practices in excavation. It is being distributed through contractors' associations, utilities and city and county agencies to firms concerned with underground construction.

Blasting Caps Accidents

Blasting cap mishaps are on the increase according to Robert L. Moore, safety expert. There were 137 children maimed or seriously injured from this source in 1957, reflecting a 21 per cent increase over the previous year.

● **CONTROLLED ACCESS EXPLAINED.** The Michigan state highway department has issued a booklet entitled "Controlled Access Expressways and Michigan's Motoring Future."

Job Safety

Bulletin, Constructor's Association of Western Pennsylvania

Some of the following items, properly applied, will assure members maximum service from their insurance carriers, and may strengthen their individual accident prevention program.

- Are you kept adequately informed of the various rating plans that may be available to you so that you may select the one which currently best fits your needs?

- Are you kept well informed of the various rateclassifications applying to your work so that you are able to properly allocate your payroll for insurance purposes and thus maintain an accurate record of your individual job insurance costs?

- Are you well advised as to adequate limits of coverage so that you are at all times well protected?

- Do you get prompt rate quotations for individual jobs for bid purposes, when requested?

- Does your insurance carrier have adequate claim and engineering service facilities in your area of operations?

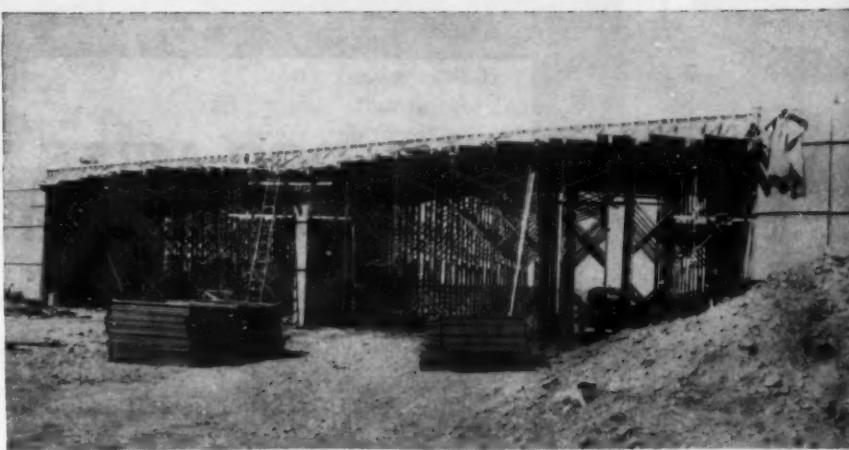
- Has your insurance carrier assisted you in developing an overall safety program which can be practically applied to your individual jobs?

- Are arrangements in effect to promptly notify your insurance carrier of each new job undertaken and does the insurance safety engineer assist you in advance planning of the safety activities for each job?

- Do your job supervisors receive adequate help in maintaining the job safety program through regular visits by your insurance company's safety engineers? Do these engineers have a good practical knowledge of construction hazards and safe practices?

- Do your insurance company safety engineers assist you in the safety training of your job supervisors?

- Are you provided with good assistance and advice in establishing first aid or medical facilities on each job?



"Building" Scaffolding Used as Bridge Shoring

Here is an interesting example of the use of prefabricated (patent) sectional steel shoring, on a bridge consisting of two arch rigid frame sections of deck. The contractor, Snitily Brothers, used this shoring method for the underpass structure for the new Peninsula Drive near Moses Lake, Washington. Arch slab is 2' 4" thick at pier edges, 1' 2" at midspan. Shoring units consist of 240 frames, 6' 6" x 5' and 78 frames, 5' x 5', and 78 frames 3' x 5'.

- Is each job provided with adequate safety posters and safety literature?

- Does your insurance company safety engineer assist you in conducting job safety meetings or supervisors and employees? Are suitable safety films provided and used when safety film showings on jobs are practical?

- Is your main office kept informed of the safety engineering service that is provided on your jobs by your insurance carrier and of the safety recommendations and suggestions made?

- Do all your claims receive prompt attention and investigation?

- Does your insurance carrier see that any of your employees who are injured receive the best medical care available?

- Are claims settled promptly and equitably?

- Are you kept informed of developments of both serious and questionable claims?

- Is the annual audit for premium determination made with reasonable promptness after expiration of policy year?

Asphalt Institute Executive Committee Meets

The 1959 Executive Committee of The Asphalt Institute—(Bottom row): J. S. Van Pelt, Berry Refining Co., Chicago; Jeff P. Royder, Houston; Chairman of the Board Don L. Nielsen, Union Oil Co. of California, Los Angeles; E. M. Stone, Empire Petroleum Co., Denver; and C. W. Turner, American Bitumuls & Asphalt Co., San Francisco; (Top row): J. J. Tumpeir, treasurer, Witco Chemical Co., New York; L. W. Walker, Leonard Refineries, Inc., Alma, Mich.; retiring Board Chairman D. H. Jenks, Jr., Ashland Oil & Refining Co., Ashland, Ky.; M. O. Hardy, D-X Sunray Oil Co., Tulsa; and W. N. Ruppel, The Atlantic Refining Co., Philadelphia. (Not present): R. B. Lewis, Shell Oil Co., New York; F. L. Dunlap, Richfield Oil Corp., Los Angeles; E. E. Scholer, Shell Oil Co., St. Louis.



**"151,000 MILES WITHOUT
A MAJOR OVERHAUL!"**

*says Clarence F. Guthrie
Canonsburg, Pa.*



Every Ford has
SAFETY GLASS
in every window

"Ford's 332-cu. in. V-8 is the hottest thing on the road for its size!"

"Our fourteen Ford trucks all have exceptional durability records. Several '55 T-800 dumps, grossing 48,000 lb., have over 200,000 miles on 'em. They went an average of 150,000 miles before we touched the engine. And for power and performance, too, the Ford 332 engine is the hottest thing on the road for its size.

"Ford's better visibility, handling ease and power steering are big factors in our excellent highway safety record. We've had many million-mile accident-free years with our Ford fleet.

"In addition to our sand and gravel business, we have ten Ford F- and C-800 tractors that make long, over-the-road trips hauling limestone one way and steel on the way back.

"On these trips parts availability is very important. Ford Dealers are about everywhere, and they all stock parts. We never get delayed waiting for Ford parts."

Go FORDWARD for savings with '59 Ford Trucks!

Whatever your job . . . wherever you do it—you'll find Ford Heavies and Extra Heavies are engineered and built to do it better! And the '59 improvements in these models will bring still more benefits to your operation.

Greater operating economy with new, faster rear axle ratios and wider choice of transmissions.

Higher payloads and longer axle life with new, higher-capacity front and rear axle options for most models.

Factory installed tractor package custom-fitted to Ford trucks for safer, more dependable braking.

More efficient parking brake of the internal expanding type has approximately 50% greater stopping and holding ability, requires less than half the operating effort needed for the previously used type.

Yes, the new '59 Ford trucks are here to take you *Ford-ward* for savings, *Fordward* for modern style and stamina.

See your Ford Dealer today!



NEW '59 FORD F-600 DUMP carries a maximum GVW rating of 19,500 lb. Now available with optional 6000-lb. front axle for greater capacity, longer life.

FORD TRUCKS COST LESS

LESS TO OWN...LESS TO RUN...LAST LONGER, TOO!

Road Design



• Glare of the opposing headlights can be drastically reduced on lighted highways, making night travel safer and more comfortable.

Some Fundamental Facts on Highway

According to this analysis, the cost of lighting an extensive arterial mileage will be more than compensated by the economic saving which will accompany the lessening of nighttime accidents.

By R. L. Smith
General Electric Company

MODERN TRAFFIC has been described as "finite particles of matter traveling along a thoroughfare in random fashion, at high rate of speed—and controlled only by the human visual process, unaided and unsupported by any technological improvement save the operator's own judgment and reaction time, which are dependent on his ability to see."

Let's examine just what we do see while driving down a major highway in the daytime.

When driving at 60 miles an hour, about all you can readily see is the stretch of road ahead. For example, try to read more than one city name on a

clustered signpost—the others are a mere blur. However, at 40 mph you will probably be able to catch maybe two names, and by dropping down to 30 mph perhaps four might be distinguished.

At high speed one part of your vision goes to pieces—that part which includes objects flashing past you at the sides of the road. Either the eye can't work fast enough to capture a speeding object, or the eye does register the image but the brain, which really does our seeing, can't recognize or distinguish the images formed by the eye.

When looking out the side windows, you can distinguish trees, fences and scenery, all of which are distinct. Little do you know it, but unconsciously you are letting your eyes travel backwards with each flying object for a fraction of a second as you fix on it. This gives you time for recognition. If you doubt this, take a cardboard tube and repeat the above. You will see nothing but a confused blur because your eyes cannot dwell anywhere long enough to recognize objects.

At slow speeds the road is clear as are the objects on either side for quite a wide range. This vision, at say 20 mph, is about the same as when you are walking or sitting. Once your speed has increased



DAY: A leader in using fixed lighting on critical highway areas, the state of California illuminates intersections like this one to be as safe by night as by day.



NIGHT: How the above intersection looks at night—as safe as it is in daytime because of the "see-ability."

Lighting

the clear area on each side contracts toward the center. About all you can state is that objects you were once noticing to the far right and left are now not being recognized at all!

● *Nighttime Driving is Hazardous.* But what does all this have to do with lighting on our highways? About 46 percent of our time consists of the hours of darkness. All other conditions of the highway remain the same—the highway's geometric configuration, the vehicle, and the operator. About 40,000 deaths and 1½ million non-fatal injuries in 1957 occurred as a result of road accidents.

While less than a third of our driving is done during the hours of darkness, two-thirds of the fatalities occur at night. It is conservatively estimated that of the 40,000 deaths last year, with 20,000 occurring at night, 10,000 could have been saved had there been adequate lighting on our highways. The National Safety Council estimates that between \$100,000 and \$125,000 total economic loss results from each fatality. Let's break this down into some interesting figures:

\$125,000 x 10,000 equals \$1,250,000,000, and divided by 170,000,000 population equals \$7.30 per

capita. Approximately \$3.50 per capita, annually, for roadway lighting will prevent these 10,000 night fatalities. This analysis means that the cure is only half as costly as the loss.

● *What is Being Done?* We are all pretty well agreed that on unlighted or dimly lighted roadways, drivers simply do not see other vehicles or obstacles quickly enough to avoid them or even to reduce speed.

The state of California is certainly one of the nation's leaders in designing highways, providing built-in safety features and spreading the taxpayer's dollar to the fullest. For the highway engineer, standards have been formulated with the best thought and approach. Quoting from the State of California, Division of Highways, Planning Manual:

"The purpose of highway lighting is to promote the safe and orderly movement of traffic by artificially illuminating certain permanent features or conditions which are unusual, require additional care and alertness to negotiate and which, if artificially illuminated, may be more readily comprehended and so compensated for by the motorist."



- Short underpasses can be illuminated by the proper placement of luminaires. Underpasses longer than 75 ft. should be illuminated by fluorescent luminaires.



- Guide signs can best be illuminated by fluorescent lighting. This installation shows recommended mounting of the lighting fixtures at the base of the sign, thereby preventing daytime shadows from obliterating the message and providing even, comfortable illumination by night.

• **What Constitutes Highway Lighting?** What is required to adequately light our highways? Basically the equipment required is a lamp, a luminaire, bracket and pole, and distribution of energy.

1. Lamp. Lamps used for lighting our highways vary considerably. Sodium lamps are still in use in some areas. Incandescent or filament lamps are in evidence also, but by and large mercury vapor sources are being used the most extensively.

This mercury source is highly efficient, emitting about 53 lumens per watt as compared to 19 lumens

per watt for the incandescent source. Fluorescent lamps, now being experimented with for use on California highways, although used in main street or whiteway lighting, are slightly higher in efficiency at 56 lumens per watt.

Whatever the source, the cost of producing light is based upon three factors: lamp efficiency, cost of electricity, and cost of lamp replacement.

Lamp preference cannot be the sole basis for selecting a lighting system. The end results of any lighting installation—uniform pave-

ment brightness and resultant safe visibility—depend upon the efficiency of the luminaire which controls and directs the light emitted from the lamp.

2. Luminaire. Basically a luminaire consists of a casing or hood, reflector, socket, and refractor or other piece of enclosing glassware for highest control and efficiency.

Mercury vapor luminaires direct the highest percentage of generated light between the shoulder-to-shoulder limits of the roadway. The small size of the lamp makes possible a reflector and refractor design of highest efficiency with relatively small luminaire size.

Exact light control means that the principal ingredient of safe visibility, namely uniform pavement brightness across and along the roadway surface, is produced. Also, the small size and weight of the unit are important advantages in highway applications where long brackets are often necessary to place the luminaire over the driving lane. There is also less load on the supporting structure, thereby reducing the strength requirement and cost of poles.

Incandescent luminaires have also found extensive use on highway projects. These units have the advantage of utilizing a lamp of simple, dependable construction, with a high degree of light control and thereby making possible uniform pavement brightness. These luminaires are also light in weight, and servicing and maintenance are simple. However, higher annual lamp replacement and energy costs will continue to restrict the use of filament units for highway applications, especially where higher levels of illumination are required.

Fluorescent luminaires are being experimented with more each day and such units will eventually find themselves applied to highway lighting in California. Already in the midwest, a complete interchange has been illuminated with fluorescent luminaires. Long lamp life, soft diffused light emitted at low brightness levels which practically eliminates driver glare, and the wide band of pavement brightness which improves silhouette visibility (especially under wet pavement conditions), plus the good color rendition all contribute to make fluorescent luminaires a very attractive source of lighting for highways.

• **Application of Equipment.** Many considerations enter into the
(Continued on page 129)

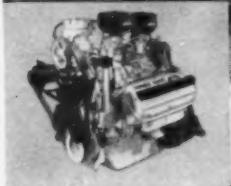
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to any job! This rugged heavyweight asks no quarter,

it just wades right in and polishes off tough hauling jobs. Two high-capacity "live" rear axles give it better flotation and traction on soft ground. And its 234-hp. engine, with dual carburetors standard, gives this T900 tractor the big-chested power to handle the big hauling jobs without tiring.

The new Dodge tandems are packed with features that make heavy-duty hauling easier and more profitable: New instrument clusters, with tachometer and graduated ammeter and oil pressure gauges standard . . . suspended brake and clutch pedals . . . 90-degree-opening hood for easy servicing . . . air brakes standard on T900 models . . . up to 20 speeds forward. But see your Dodge dealer—and get the *heavy-duty* reasons why . . .

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to choose **Dodge**
Trucks



Built throughout for dependable heavy-duty service, this 354-cubic-inch V-8 has dome-shaped combustion chambers . . . double rocker-arm shafts . . . precision timing gears instead of chains . . . positive exhaust-valve rotators . . . hydraulic tappets . . . sodium-cooled exhaust valves. And it develops full power on thrifty *regular* gas!

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 UTAH—Arnold Machinery Co., Inc., Salt Lake City
 VERMONT—Reynolds & Son, Inc., Barre
 VIRGINIA—Nesbitt Equip. Co., Alexandria • Phillips Machinery Co., Norfolk-Richmond • Shelton-Witt Equipment Corporation, Salem
 WASHINGTON—Air Mac, Inc., Seattle • Intermountain Equipment Company, Spokane
 WEST VIRGINIA—Machinery, Inc., Charleston
 WISCONSIN—Hunter Machinery Co., Inc., Milwaukee-Green Bay
 ALASKA—Northern Commercial Co., Seattle, Wash.



Michael Parisi, president of M. Parisi & Son, Inc., New York City, has built a successful and fast-growing general contracting business on service and quality work. The 1958 expected gross will be nearly two million dollars.



"**We're in the jet age** with our work here at New York's Idlewild International Airport. We did (1) concrete foundation and apron jobs for the Pan American Airways Terminal Building, (2) lay hangar concrete and (3) put in slab for two 1800-ft. runway extensions. The strict specs and tight schedules had to be met. We came out ahead on both counts with our new Rex Concrete Paving Spread."

America's new 124-ton jet giants are the world's toughest task masters of airport construction.

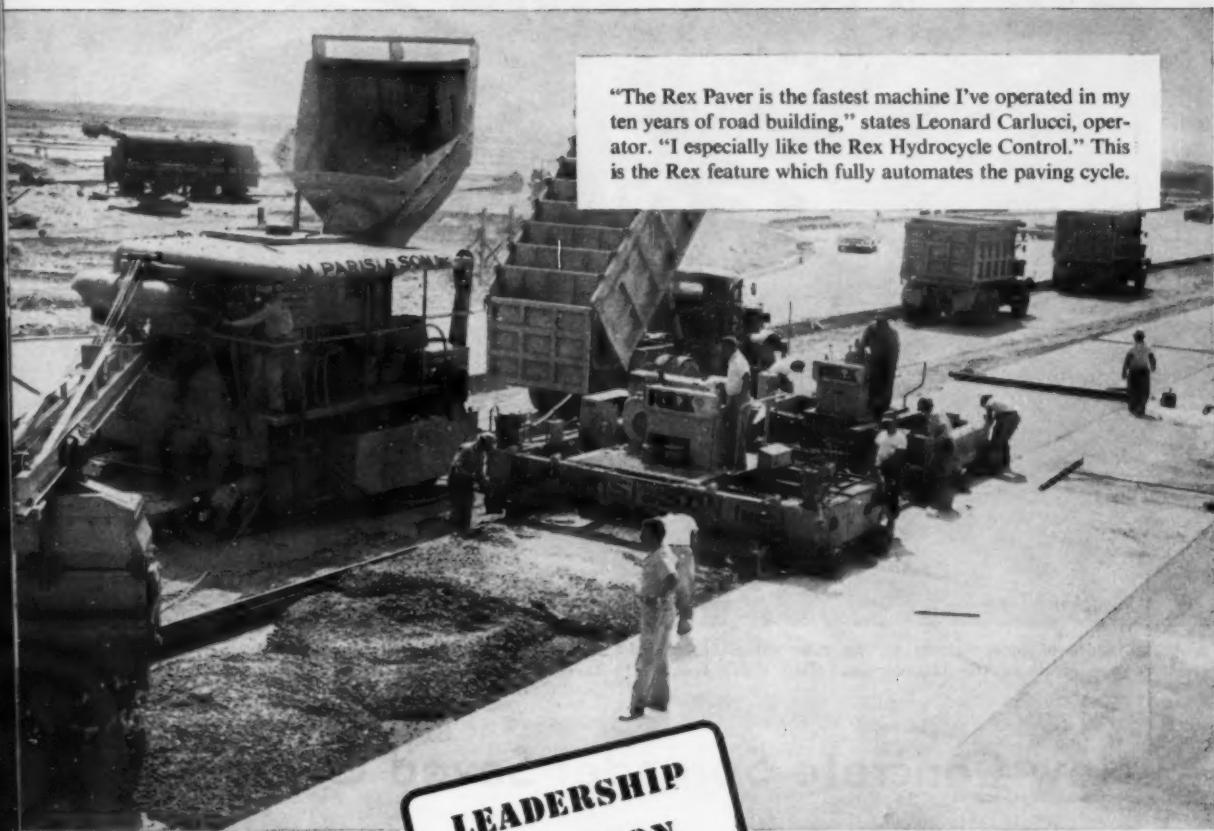
Helping New York's Idlewild International Airport prepare for them was M. Parisi & Son. One phase of its three jobs was a 50,000-square-yard area of concrete apron and foundation for the huge new Pan American Airways Terminal Building. Apron slab was in 12½-ft. widths; thickness was 13 in. 700 psi-28 day specs were called for—and were delivered by Parisi with its Rex Concrete Paving Spread.

"The Rex Package exactly suited our requirements," states Mr. Parisi. "Our Rex Paver mixed and poured 1.44 cu. yd. in less than 50 seconds. Following is the Rex Spreader—which, with its screw-spreading, has us completely sold for fast, even distribution of the pour. Next, our Rex Finisher did a fine job, giving us a perfect level. The entire spread operated on Rex Forms."

Summing up the performance of his Rex Concrete Paving Spread on all three of these important airport jobs, Mr. Parisi concludes, "We are very pleased with the dependability of the Rex machines."



batches with our REX Paving Spread!"



"The Rex Paver is the fastest machine I've operated in my ten years of road building," states Leonard Carlucci, operator. "I especially like the Rex Hydrocycle Control." This is the Rex feature which fully automates the paving cycle.

LEADERSHIP
IN ACTION



The new Rex Spreader, the industry's most advanced. Operator William Fahey says, "It's the easiest to handle and it gives me perfect control of concrete distribution."

"In 18 years of construction and road building, I've operated about all finishers. I haven't seen any that holds the line like this Rex Finisher," comments John Harvey, operator.

ROAD BUILDERS LIBRARY.

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ROADS AND STREETS, February, 1959

REX®
CONSTRUCTION MACHINERY



• Aerial photo of interchange; paving near completion. Note short haul from batching plant, set up inside one circle of the intersection. Slab width frequently flares from 12 to 17 ft.

New Concrete Spreader Saved Overtime

ON the cloverleaf interchange of U. S. 30 East and the new "I" Route (Project 1) near Mansfield, Ohio, V. N. Holderman Paving Inc., set up for a daily production of 500 concrete paver batches of 1.38 cu. yd. Even with two finishing machines, one for each lift, it took 10 hours to place and finish this production because of the flared slab design which varied from 12 to 17 ft. and the super-elevated curves.

To get faster production, George Yinger, Holderman's vice president,

placed a new type Jaeger JSX all-hydraulic concrete spreader-finisher immediately behind the paver. This spreader-finisher provided infinite width adjustability by hydraulic self-winding, and it came equipped with a diagonally adjustable, oscillating finishing screen in addition to dual spreading screws and strike-off. The spreading screws were extensible to 16 ft. without adding parts and to 18 ft. by clamp-on screw flights. Screed extensions equipped with infinitely adjustable end-shoes

provided all screed widths. The diagonal screed handled the super-elevation, being diagonally adjustable to the angle needed to work concrete up-hill solidly against the higher form.

The one machine also was able to rapidly spread and strike-off base course for reinforcement and then, on a second pass, spread, strike-off and finish the top course. On their first day's operation by using this spreader-finisher, Holderman's crew placed and finished 490 batches in 8 hours. Completing their scheduled 500 batches in 8 hour shifts instead of 10, saved \$400 to \$450 a day of overtime. The diagonal finishing screed also eliminated carry-back and shovels on super-elevated curves, saving 4 to 6 men.

• Spreading and striking off base course for mesh. Dual spreading screws are independent. Bank of hydraulic levers controls all functions.



NIGHT VISIBILITY 1958 (Bulletin 191). The Highway Research Board, 2101 Constitution Ave., Washington, D. C. Price \$1.40. Contains two informal papers and a discussion summary from the sessions at the 37th Annual Meeting of the Board.

HIGHWAY LIGHTING

(Continued from page 124)

placement of luminaires, their choice, and the resulting light pattern on the pavement. Almost every lighting installation has something peculiar about it. However, when projects are new and properly planned, certain basic principles and lighting methods can be applied effectively to produce a well-lighted roadway.

Main stretches of highway are not generally lighted, although 53 miles of a Connecticut highway have just been continuously lighted. Most lighting in California is provided at intersections, freeway connections, and interchanges. Let's examine how lighting equipment is applied to these areas.

● **Underpasses.** Underpasses exist wherever an interchange occurs; however, these are generally relatively short underpasses, perhaps up to 75 ft. in length and adequate illumination can usually be provided by conventional and well-placed roadway luminaires. Care should be taken to assure a large amount of light being projected underneath the structure, not cut off and causing a shadow.

For longer underpasses or tunnels where lighting is difficult to obtain by conventional units, fluorescent strip lighting is often employed. This source lends itself ideally where mounting heights are low and wall and ceiling brightness as well as uniformly illuminated roadways are desired. For long underpasses or tunnels lighting often will be left on in the daytime as well as at night.

● **Sign Lighting.** Everyone has at some time recognized a turn off point too late, then found it necessary to travel a considerable distance before he can double back and correct the mistake. Adequate signs, with clear messages, and located early enough to enable making a proper change of lanes, have corrected this problem. At night when visibility is even poorer, sign illumination is a definite asset to any highway lighting installation. High speeds require rapid discernment of the message and sufficient time for maneuvering.

Fluorescent sign lighting fixtures are almost exclusively employed, providing uniform illumination over the entire sign face. The sign brightness should be sufficient so that it will stand out in contrast to

its surroundings, and the luminaires should be positioned so that neither direct nor reflected glare results. The lighting equipment should also be mounted so as to be inconspicuous from either direction, and not interfere with the view of the sign.

● **What does this all add up to?** Millions of dollars are being expended on our highway system. Untold manhours have been spent in the design of these highways. But who decides when and how these highways will be used? The man behind the wheel, Mr. Average American Driver! The engineer can control to some degree how fast he drives and where he gets on and off, but there is absolutely no way that he can be told when to use the highway. Lighting, however, will encourage more after-dark use of this multimillion dollar investment.

Today's highway designer is urged, by Congress, to include all design features required to accommodate traffic of the year 1975. The capacity of the highway system, then, becomes of great importance. Adequate illumination can increase highway capacities by:

1. Encouraging the use of highways on a 24-hour basis, thus reducing peak-load curves which, in turn, determine design requirements.

2. Permitting higher safe driving speeds. On lighted highways, safe speeds may be fully 10 to 20 mph higher than on unlighted roadways.

3. Encourage utilization of lanes. Proper use of modern lighting is the best insurance for the highway designer that his end product will be used to maximum efficiency.

The highway designer should plan lighting for at least these seven critical elements of the highway:

1. Interchanges and intersections
2. Entrance and exit ramps
3. Areas of traffic convergence or divergence
4. Bridges and viaducts
5. Tunnels and underpasses
6. Highway guide signs
7. In addition, continuous lighting is warranted within urban areas, heavily traveled stretches, and wherever interchanges are located less than a distance of one mile apart.

An unlighted highway can be termed a defective highway, and we cannot afford to have our highways blacked out!

Home-Made Side Boom

For pipe laying, when necessary to use the same truck that hauls the tools, a side boom can be rigged from materials usually found around the pipe yard. It consists of a frame made from 4-in. pipe which rests on the truck bed, and a welded 6-in. boom supported on braces on the side. The frame chained down to the truck bed and a snatch block hooked into the end of the boom, it is ready to handle pipe from the side for stringing and laying.



● W. H. Patterson Co., Baton Rouge, La., highway contractor, finds there is almost no end to the tasks its International TD-9 4-in-1 can do. Shown backfilling drain tile pipe ditch, the unit is also used for dozing, grading, loading, and digging ditches.

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- Easily portable (wheels optional)
- Complete with wire-braided steam hose, and soap hose
- Burns kerosene, No. 1 or 2 fuel oils, or natural gas
- Simple, one-man operation

For biggest jobs: Vapor Upgrader Sr.
1500 gal/hr at 250 psi.
Full details on request.

Airfield Pavement Removal

Contract was made with the Department of the Navy for reconstruction and improvement at Corry Field, N.A.A.S., Pensacola, Florida. A subcontract was made for the removal of the pavement with the stipulation, "The subcontractor agrees that the work to be done is as follows, . . . all pavement removal except the sand-shell and weep-holes." For the removal of the pavement cut from the storm drainage ditches and piled along the edge of the runways the sub-contractor claimed \$11,321.84 over and above the contract for the pavement removal job.

In its decision of the action brought against the contractor by this subcontractor the United States District Court said, "The one item remaining in controversy is a claim for the hauling and disposal of a quantity of old pavement removed from the drainage trenches.

"This court finds and holds that this provision of the contract did not obligate this subcontractor to remove the pavement from the storm drainage ditches and piled along the edge of the runways. The obvious reason for this interpretation of the cold language of the contract is that no one had any knowledge of the amount of pavement that would be cut and removed from the drainage ditches."

*Faulk & Coleman Construction Co.
v. B. B. McCormick & Sons, 151
F.S. 206, Florida, May 2, 1957.*

Water contamination

Subcontractor undertaking the paving of a Pennsylvania highway leased a tract of land for space for mixing the paving material, and for heavy machinery installed for transporting paving material from the bins erected on the plot, to the trucks.

Slag used in the concrete mix was sprayed with five to ten thousand gallons of water daily, contaminating the water of a spring on adjacent and lower land. The Pennsylvania Supreme Court sustained a judgment against this contractor for \$16,000. "The area," said the court, "is residential. Where the particular activity or inactivity is not suited to the character of the locality the invasion it causes is generally unreasonable as a matter of law if the harm involved is at all serious."

*Burr v. Adam Eidemiller, Inc., 126
Atl. 2d 403, Pennsylvania.*



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No name in heavy hauling equipment merits more respect for reliable performance than Reo's rugged line of trucks. Every Reo is engineered to its specific job . . . custom built completely to it . . . and powered by the most advanced high-efficiency engines available—gas, LP-Gas and Diesel. This power is coupled to power train components of proven performance, assuring speed and agility under full loads. To reduce chassis weight, Reo's framework is engineered to provide the ultimate in strength with the lowest possible weight. **Additional allowable payload within legal limits is possible through Reo axle placement.** For information on Reo's complete tandem line, including special models for **transit mix, dump work and oil field service**, write for new model folder.
REO DIVISION, The White Motor Company, Lansing, Michigan.



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Where the going is rough, records prove job-engineered Firestone tires give you extra hours of service! Cost-conscious contractors count on Firestone to keep all off-the-highway projects—from earthmoving to grading and hauling—rolling on schedule. Here's why—they're built with Firestone Rubber-X, the longest wearing rubber ever used in Firestone tires! And Firestone S/F (Shock-Fortified) nylon and rayon bodies withstand bruising shock and impact for maximum tire protection. With treads engineered for every job, Firestone off-the-highway tires deliver the extra stamina, strength and pulling power that turns downtime delays into worktime profits! See

your Firestone Dealer or Store and ask about the full line of Firestone tubeless and tubed off-the-highway tires and on-the-job tire service.

*Firestone T.M.

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Rock Grip
Wide Base*

ANS
Earthmover

Ground Grip*
Wide Base

Super Ground Grip*
Road Builder

Super Rock Grip
Deep Tread

Super Mileage
Lug Logger

Rib Excavator*

... for more details circle 309 on enclosed return postal card

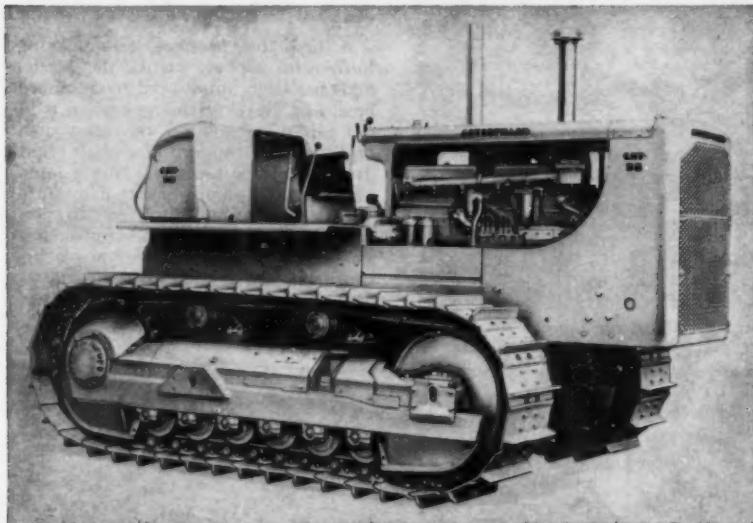
New Products

Reader Service Numbers on Enclosed Postcard
More Products beginning on page —

Caterpillar Introduces New D8

Two new Caterpillar D8 tractors, said to possess more weight, horsepower and productive ability than their predecessors, are announced

blade load 10 percent greater. A new line of matched tools for the series H D8 has also been introduced, including new dozer blades



New Series H Caterpillar D8

by Caterpillar Tractor Co. The new machines are the Caterpillar series H D8 direct drive and torque converter tractors.

Weight of the new direct drive model is 47,102 lb., an increase of 4,377 lb. over the previous one. In torque converter models, the 47,875-lb. weight of the new series is 4,480 lb. greater than the old machine. Dimensionally, the new D8s are 9 in. longer and 5 in. higher. Gauge has been increased from 78 to 84 in. Use of double reduction final drive gearing helps provide ground clearance of nearly 20 in. on the new units, 50 percent more than the previous tractors. Flywheel horsepower of the new models has been increased to 225 from 191, with drawbar horsepower on the direct drive model now 180, up from 155. Torque rise of the new series H engines has been increased to 20 percent.

Production advantage for the newly developed D8 was 20 percent over its predecessor in all dozing operations tested, with

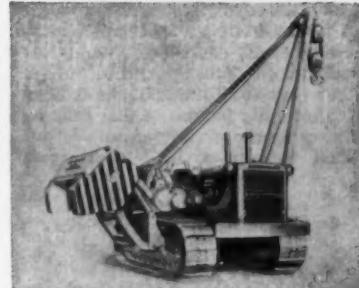
—straight, angling and 'U'—ripper and hydraulic controls.

Caterpillar Tractor Co., Peoria, Ill.

For more details circle 101 on
Enclosed Return Postal Card.

Cat Pipelayer

Also being announced by Caterpillar Tractor Co. is the new series H No. 583 Pipelayer, with lifting capacity, at 4-ft. overhang, of 137,000 lb. Weight is 83,840 lb. and



Cat Series H Pipelayer

flywheel horsepower is 225, compared to 191 on the series E. Top speed is 6.4 mph, a 1 mph increase over the old model.

Higher horsepower is due to incorporation of a turbocharger on the new engine, according to the company. Other engine features noted are the dry-type air cleaner and increased efficiency of engine lube oil filtration accomplished by the use of two large-capacity filters. Other developments in the machine are pressure lubrication of the entire power train with completely filtered oil, a new track group-links, pins, bushings and shoes—and adoption of double reduction spur gears in the final drive.

Caterpillar Tractor Co., Peoria, Ill.

For more details circle 102 on
Enclosed Return Postal Card.

Striping Machine

A new striping machine "Town and County" Model 55J has been added to the line of Wald Industries, Inc. It operates completely within one lane. The short turning radius is stated to make it extremely flexible for city work. An automatic speed pilot insures smooth speeds from 4 to 15 mph as desired, having several settings in both low and second gears. For smoother operation there is also a completely new four-wheel drive, that can be easily serviced anywhere.

One man operates the "Town & County" from cab position. Push button striping places automatic pattern-



Town and County Model 55J

ing of lines at his fingertips and regulates intermittent advance and retard. The electrically controlled "Wald Nutmatic" striping guns are within the operator's view at all times. There is clear view ahead also for the tabular pointer in following the preline layout.

Wald Industries, Inc., Huntington, Pa.

For more details circle 103 on Enclosed Return Postal Card.

Stabilization Plant



Boardman Central Mix Stabilization Plant on Job

A 1000 ton per hour Central Mix Stabilization plant, announced by The Boardman Co. is completely portable and equipped with double discharge hoppers.

The basic unit includes a twin shaft pug-mill type mixer and a 5 cu. yd. discharge hopper with a hydraulically operated clamshell gate. It also is built with an operator's platform running the full length of the unit. It includes a self-priming water pump and precision water meter to assure an accurate water flow to the spray bar.

The basic unit is for the preparation of stabilized aggregate base material. With the addition of a silo, the unit can be converted to a soil-cement stabilization plant.

The Boardman Co., Oklahoma City.

For more details circle 104 on Enclosed Return Postal Card.

Asphalt Patch Plant

Wylie Manufacturing Company's Model 310 is a complete mobile asphalt plant built on a two-wheel trailer. It has been made small and compact for easy handling on the road, but with all the features for producing good asphalt common to large stationary plants. These features include an aggregate drier which avoids necessity of drying materials in the pug mill, a heated asphalt tank, and a volumetric as-

phalt batch measuring system.

The Model 310 will handle all types of paving aggregates, $\frac{3}{4}$ " minus. The asphalt system is designed for use with all asphalts, to produce either hot or cold mixes.

The machine is also suitable for remixing stockpile material. Capacity: Hot mix—up to 5 tons per hour, dependent on moisture content and type of aggregate and asphalt. Cold

that provides easy starting, smooth idling, general overall smooth operation and smooth pickup of loads. The electrical system is 12-volt. Fuel tank holds 27 gal.

Attachments and accessories that add to year-round versatility of the Model D include a mid-ship mounted scarifier for maximum penetration, $\frac{3}{4}$ -cu yd rear-mounted loader, shoulder maintainer, and a hydraulically controlled snow plow.

Allis-Chalmers Manufacturing Co., Milwaukee, Wisc.

For more details circle 105 on Enclosed Return Postal Card.

Asphalt Plant Burner

A new low pressure, air-atomizing burner for asphalt plants, the Model S-M, has been announced by Standard Steel Co. Designed for operation with the carefully balanced exhaust system on Standard's "Superlift" asphalt plant dryers, the new burners assure a long, uninterrupted, high-velocity flame producing a penetration and equalization of heat in the dryers heretofore not available in a low pressure burner, according to M. B. Freeman, vice president, Road Machinery Division.



The Wylie Model 310 Patch Mix Plant

mix-up to 8 tons per hour.

Wylie Manufacturing Co., Inc., Oklahoma City, Okla.

For more details circle 105 on Enclosed Return Postal Card.

Improved Model D Grader

Allis-Chalmers has announced a new 4-cylinder, 58-hp gasoline engine for its Model D Motor Grader (8800-lb weight classification). Maximum power and fuel economy are provided by the engine's accurately controlled combustion chamber formed by crater shaped pistons. Turbulence thoroughly mixes and vaporizes the air-fuel charge, giving even firing and peak performance using "regular" gasoline. Full horsepower at low engine speed of 1,650 rpm, and a high 7.25:1 compression ratio contribute to efficiency.

Paired with this new engine is an increased capacity 11-in. diameter heavy-duty clutch, and a 13 $\frac{1}{2}$ -in. flywheel

The Model S-M burns heavy fuel oil, gas, or both and is furnished completely assembled on a common base. An air-atomizing igniter burner is included for faster, easier start-up. It is available in a wide range of sizes and capacities to fit particular plant needs.

Standard Steel Corporation, 5001 South Boyle Ave., Los Angeles 58, Calif.

For more details circle 107 on Enclosed Return Postal Card.

Motor Grader

Allis-Chalmers adds to its construction machinery line with the Model One Forty Five motor grader, a 21,540-lb. unit powered by an A-C 4-cyl. Diesel engine developing 80 hp at 1800 rpm. It has six forward speeds ranging up to 20.3 mph, and three reverse speeds up to 7 mph.



Allis-Chalmers Motor Grader

The new grader offers high clearance under the front axle and moldboard circle for handling big windrows, and 90-deg. maximum bank cutting capability of its 12 ft. moldboard for back sloping highway cuts and ditch construction. It has a wide shoulder reach outside the front wheels which is said to facilitate such work as grading soft highway shoulders. Power operated leaning front wheels and a weight of 6,500 lb. on the front axle give the new motor grader extra resistance to side thrust of big moldboard loads and provides extra front-end stability, it is said.

**Allis-Chalmers Manufacturing Co.,
Tractor Group, Milwaukee, Wis.**

For more details circle 108 on
Enclosed Return Postal Card.

Bridge Deck Finisher

A new type of concrete bridge deck finisher has been put into production by Master Vibrator Co. It has a total weight of less than 3,000 lb., and is stated to do a job on bridge decks equivalent to that done on roadways by a finisher.

This new machine strikes off, vibrates, compacts and finishes concrete to specification in one pass, providing a smooth, accurate finish. It is simply designed—5 ft wide, 2 ft 11 in. high, and adjustable in length from 15 to 31 ft. It has no complicated hydraulic or control systems.

The entire unit can be easily moved by a crane or "A" frame and comes equipped with a special sling for picking it up. The new finisher has four 12-in. flanged wheels which ride on standard forms, bulb angles or pipe rails with no damage due to weight. Lo-gear winches on each side of the machine have 100 ft of $\frac{1}{16}$ -in. aircraft cable which is strung out in front of the machine and fastened by a special hook to the bulb angle. As the cable is reeled in, the machine pulls itself forward at a uniform rate—approximately 2 to 6 ft. per minute.

**Master Vibrator Co., 1752 Stanley
Ave., Dayton, Ohio.**

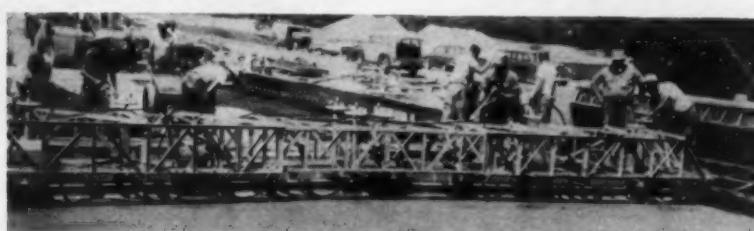
For more details circle 109 on
Enclosed Return Postal Card.

Caisson Borer

A new boring machine, made by Hugh B. Williams Manufacturing Co., mounted on a Model 44 Lima crane is capable of augering holes up to 8 ft. in diameter to a maximum depth of 60 ft.



Model LLDH Boring Machine



Master Concrete Bridge Deck Finisher

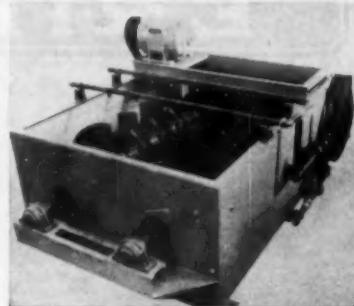
The claims for the machine include: The flotation and stability of the long tracks and undercarriage make quick work of the movement from hole to stake. The inherent design characteristics of the crane provide extra reach for otherwise inaccessible spots and the versatility of a combination drilling unit and crane multiply the efficiency. The entire drilling unit can be removed and the lattice boom pinned in place in a short time.

Other features of the crane-mounted digger include: High and low speed rotary clutches for ease of operation, eight forward auger rotary speeds and four reverse, dual facilities for hoisting and extending the kelly bar, friction clutches to insure high speed in-and-out operation, and hydraulic pressure for slow, powerful movement.

**Joslyn Manufacturing and Supply
Co., 2101 Corinth St., Dallas, Texas.**

For more details circle 110 on
Enclosed Return Postal Card.

Road Base Mixer



Eagle Stabilized Road Base
Material Mixer

A mixer for plant-mixing of stabilized road base material has been developed by Eagle Iron Works. The mixer consists of a tub with two rows of opposing paddles on tubular steel shafts. The paddles not only mix the materials, but convey them toward a discharge opening at the same time. Mixer can be erected over a bin or mounted at an elevation for discharging directly into trucks. It can be equipped with spray bars mounted over the tub. Flow meter, valves and piping are optional equipment. Available in four sizes with capacities of 125 to 500 tons per hour.

**Eagle Iron Works, 140 Holcomb Ave.,
Des Moines, Ia.**

For more details circle 111 on
Enclosed Return Postal Card.

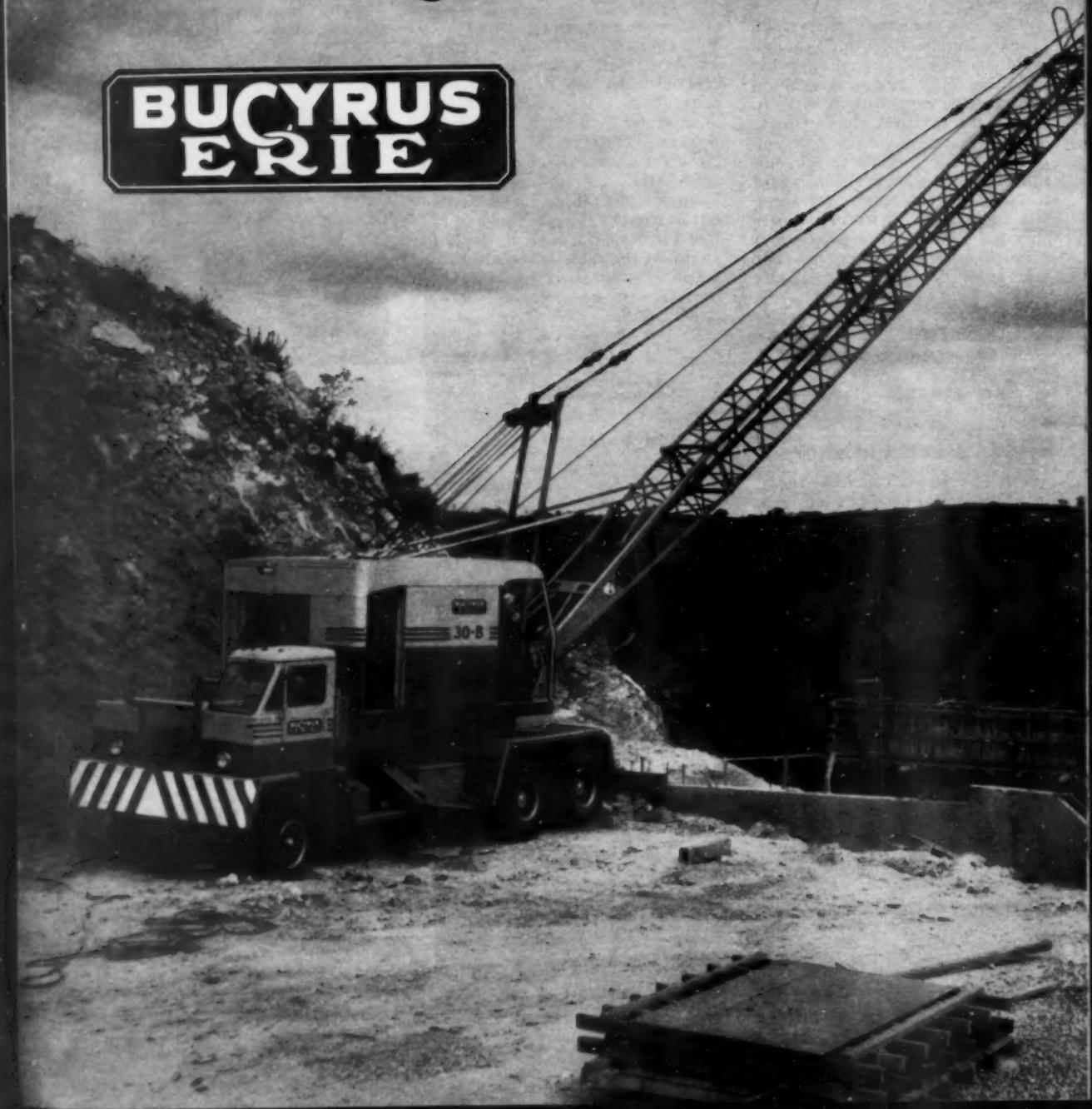
Pneumatic Tire Roller

A new 10-30 ton, 7-wheel self-propelled pneumatic tire roller, Model PSR-30 has been added to the Buffalo-Springfield line. A special transmission, including torque converter, offers three

(Continued on page 139)

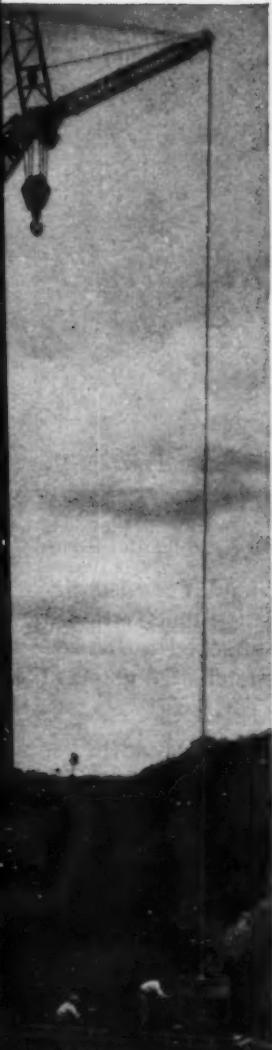
NEW

**BU_CYRUS
ERIE**



45-TON CAPACITY

30-B transit crane



Here's the big, new Bucyrus-Erie 30-B Transit Crane — designed to give you the *best* lifting crane in its class plus the tops in digging advantages as a 1-yd. hoe, shovel, dragline or clamshell. It's loaded with profit-boosting, cost-cutting improvements:

INCREASED LOAD CAPACITY AT GREATER RADIUS— With a 40-ft. boom, the 45-ton maximum allowable load can be lifted at radius of 15 feet.

NEW BOOM — The crane boom, fabricated of high-strength alloy steel, is designed with heavier chord angles and larger cross sections.

ANTI-FRICTION MOUNTING FOR POINT SHEAVES— Point sheaves are mounted on pre-lubricated, sealed, anti-friction bearings.

AIR-OPERATED BOOM HOIST AND ENGINE MASTER CLUTCH have been added to the 30-B's already convenient, quick-response, air-control system.

ADJUSTABLE CONE ROLLERS provide proper clearance between rollers and roller path. Rollers are also fitted with long-life, heavy-duty bushings to handle the greater roller loads.

BIG, RUGGED, 6 x 4 or 8 x 4 CARRIER, specially designed and built for fully convertible crane-excavator service, is available with gas or diesel engine.



send in coupon ▶

... to get the complete story on how the new 30-B Transit Crane adds up to the soundest equipment investment you can make TODAY.

**BUCYRUS
ERIE**®

Builds Better Equipment

... for more details circle 289 on enclosed return postal card

BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

Gentlemen:

I'd like more information on the new 30-B Transit Crane.

NAME.....

COMPANY.....

ADDRESS.....

CITY..... STATE.....



**Greater
Value In
Improved
Conventional
Trailers**

It was logical for Hoffman Trucks, Inc. of Belleville, New Jersey, prominent among leading heavy movers, to come to Rogers Brothers Corporation for the design and construction of a most unusual trailer to meet their special needs. Its tremendous size is indicated in contrast with a Rogers 25-ton TTV top value trailer.

Conservatively rated at 200 tons it mounts 40-12 x 24-14 ply tires on axles which oscillate lengthwise and crosswise to equally distribute the load.

THE FRONT GOOSENECK rides on a dolly to increase the number of tires, improve maneuverability and absorb part of the load on the tractor. The trailer can be hauled with or without the dolly.

A self-powered hydraulic mechanism will raise or lower the deck for greater roadway or overhead clearance as required.

The unit at the rear supplies power for steering in addition to its use on the deck height and gooseneck removal.

THE DETACHABLE REAR ASSEMBLY consists of two — 8 tire double oscillating units with two removable 4 tire units attached to the walking beam. This places a total of 24 tires under the rear of the trailer.

The detachable axles are caster mounted to track with the trailer in forward movement. Power steering is applied to the caster axle for sharp turns or for steering in a reverse direction.

The detachable assembly and the front dolly may be removed for standard semi-operation.

To meet length limitations and permit faster return trips, a "Stub" connector is substituted for the regular deck which is carried on the goosenecks. This shortens the overall length approximately 30 feet.

GET THE ROGERS CATALOG or request additional information if desired. If you have an unusual problem the advice of Rogers' engineers is available without cost or obligation.

ROGERS BROTHERS CORPORATION

ALBION, PENNA.

Export Office: 50 Church St. • New York 7, N.Y., U.S.A.

Cable Address: BROSITES

... for more details circle 343 on enclosed return postal card

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ROADS AND STREETS, February, 1959

New Products

(Continued from page 135)



Buffalo-Springfield 7-wheel Pneumatic Tire Roller

speed ratios and an infinite range of rolling speeds up to 19.4 miles per hour—forward and reverse. Power from a 125-hp Cummins diesel engine is delivered to the four drive wheels of the Model PSR-30 through two propeller shafts running from the differential case to a final drive gear case on each wheel pair.

By varying the type and amount of ballast, wheel loads from 3340 lb. per wheel to 8600 lb. per wheel can be obtained. All wheels oscillate, the drive wheels in pairs and steering wheels through center-pivoted yoke, to give maximum compaction to all materials, regardless of grade contour.

Buffalo-Springfield Roller Co., Division of Koehring Co., 1210 Kenton St., Springfield, O.

For more details circle 112 on Enclosed Return Postal Card.

Concrete Joint Tape

A new concrete joint curing tape put on the market by the Prestite-Keystone Engineering Products Co., is said to be able to do four different jobs on newly sawed or formed joints in Portland Cement Concrete paving: (1) retains all the original moisture in the green concrete essential for curing the joint walls and edges; (2) prevents infiltration of foreign matter into the joints until they can be sealed; (3)



Concrete Joint Tape

eliminates need for running a saw blade through the joints prior to sealing to clear them of incompressible and other foreign matter; (4) eliminates need for blowing joints with compressed air prior to sealing. The new tape, called "ConSeal" consists of two parallel ribbons of mastic, set about $1\frac{1}{2}$ " apart, applied to a polyethylene tape, and protected by a glassine backing. In use, the backing is snapped off, and the mastic ribbons are applied astraddle of the joint by pressing down on the polyethylene tape.

The new curing tape makes obsolete such other conventional materials as paper, felt, jute, cotton rope, sand, fiber and wood strips.

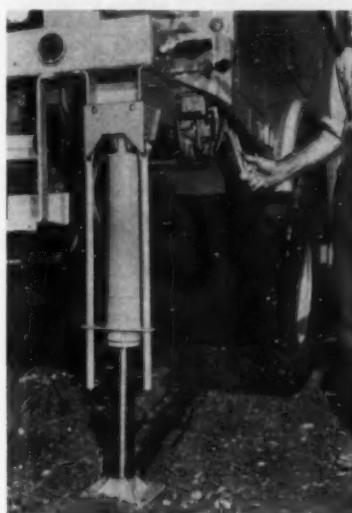
Illustrated literature is now available for those interested in the new product.

Prestite-Keystone Engineering Products Co., 39th and Chouteau, St. Louis, Mo.

For more details circle 113 on Enclosed Return Postal Card.

Hydraulic Jack

A new self-storing hydraulic jack has been introduced by Holan Corporation. A pair of the jacks enable users to stabilize trucks or to lift either side.



Holan 5095 Jack

With a push of the control lever, the jack swings down and reaches maximum extension in 8 seconds. With a pull on the same lever, the jack returns to the out-of-the-way stowed position in 6 seconds. Jacks are used for stabilizing parked trucks using power equipment, for spotting diggers and for changing tires.

The Holan jacks have a 14,000-lb capacity, a 40 in. maximum extension (from top to base plate) and a length of 25 in. when stowed. Hydraulic Power is supplied from existing hydraulic systems on the trucks or from a separate circuit installed with the jacks.

Working pressure is up to 1,200 psi.
Holan Corporation, 4100 West 150th St., Cleveland 35, Ohio.

For more details circle 114 on Enclosed Return Postal Card.

Truck Flotation Tires

Smooth-Contour flotation tires that are stated to enable batch trucks to operate continuously on sandy beds without stalls or breakdowns have been announced by Harmo Tire & Rubber Corporation. They may also be used for hauling over soft black top or concrete without marring surface.



Single Flotation Tire on Ford Batch Truck

One 54 x 20 flotation tire replaces dual tires. These Harmo tires fit standard rims of International, Ford and all other makes of batch trucks, and may be adapted to tandem axles. Carrying capacity of the 20-ply nylons is approximately 16,000 lb. per tire.

Flotation tires are tires with extra tread, flexible side walls and low operating pressures (35 lb.). They give more than double the contact area of conventional tires.

Harmo Tire & Rubber Corporation, 1050 18th St., Detroit 16, Mich.

For more details circle 115 on Enclosed Return Postal Card.

Loader Shock Absorber



Greerulator Bucket Loader Installation

A—Lift Cylinder; B—Piston; C—Main Pressure Line; D—Greerulator (shown enlarged); E—Control Valve; F—Pump; G—Return Line; H—Reservoir.

A new light-weight disposable hydro-pneumatic accumulator designed to absorb shock and vibration on bucket loaders and fork lift trucks, has been announced by Greer Hydraulics, Inc. Manufactured in 1-qt and 1-gal sizes, the new accumulator, called a "Greerulator", consists of a two-piece bladder and only three moving parts. It is de-

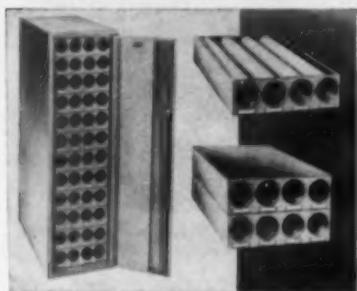
signed for a working pressure of 2,000 psi, a proof pressure of 4,000 psi, and a burst pressure of 6,000 psi. It comes pre-charged with inert nitrogen gas, approved by the Interstate Commerce Commission for shipment.

Greer Hydraulics, Inc., N. Y. International Airport, Jamaica 30, N. Y.

For more details circle 116 on Enclosed Return Postal Card.

Roll File Units

A new tube filing system for rolled prints, charts, drawings, maps, tracings, etc., has been announced by Plan Hold Corporation. The Plan Hold roll file consists of modular steel encased Duro



Tube Filing Units

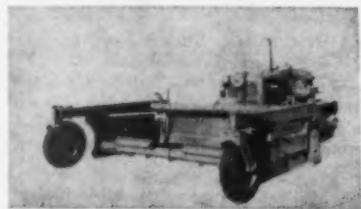
tubes in units of four tubes per file. The units measure 12 in. wide by 4 in. high by tube length. The 2 1/8-in. inside diameter tubes are offered in two tube lengths, 27 in., and 33 in. A steel filing cabinet with cylinder lock is handle and accommodating a total of 12 roll file units (48 individual tubes) is also available.

Plan Hold Corp., P.O. Box 1038, South Gate, Calif.

For more details circle 117 on Enclosed Return Postal Card.

New Base Spreader

The ULMAC U-100 base spreader here pictured attaches to any Caterpillar D8, D7 or D6 track-type tractor. Attachment is made in a matter of minutes push fork arms slip onto the trunnions and are secured by one bolt on each side. The dozer blade serves as the strike-off. Spreader box is secured to the dozer blade by wing-nut clamps.



The Almac U-100 Spreader

The new spreader adapts quickly to any dozer blade width. Exclusive tubular crossbeams telescope to the required width. Four bolts on each cross beam center flange permit quick set-up and

make adjustment to the blade width easy.

The manufacturer states that fast, accurate spreading in lifts from 1 in. to 20 in. is assured in widths which can be varied from 8 ft. to 16 ft. Large push rollers handle tandem of largest trucks. Three position caster wheels can be positioned in line with spreader box frame or to 10-in inside frame, providing easy truck entry and parallel lifts. Parallel lifts are made accurately without spillage or waste.

Ulmac Equipment Co., Inc., El Paso,

For more details circle 118 on Enclosed Return Postal Card.

Dual Front Wheels

A new dual front wheel assembly has been developed which, it is said, will permit front axles to carry 18,000 lb. or more and which will increase tire mileage more than 50 per cent. Truck Equipment Company says that the dual front wheels give 100 per cent more road contact, thus providing increased safety for the driver and his load. The unit permits increased payload, additional "cube" capacity and



Dual Front Wheels

greater front end stability. Front tires and wheels are interchangeable with rear tires and wheels. Parts are interchangeable with standard units now in service.

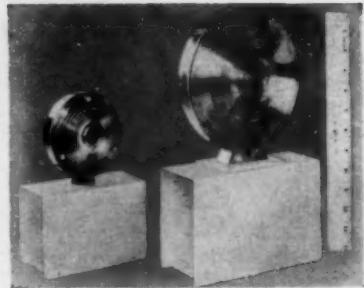
The four front tires are mounted on standard wheel bearings and are mounted individually to allow each wheel to roll free of the other.

Truck Equipment Co., 3963 Walnut St., Denver 5, Colo.

For more details circle 119 on Enclosed Return Postal Card.

Flasher Light

A new 7 in. transistorized flashing light for large construction and runway jobs has been developed by Traffic Equipment Company of Denver, Colo. The large, specially designed high impact plastic lens and the longer, slower flash (50 to 60 per minute) gives better



Transistorized Flashers

warning to motorists approaching at higher speeds.

The lens design has an exclusive reflector ring at the outside which produces added brilliance when car lights strike the lens.

The 7 in. Sentry light (model SFL-67) is known as "The Commander" while the 4 in. model SFL-64 is known as "The Vigilant." The smaller conventional flash is identical with the larger unit except in lens design and diameter.

Traffic Equipment Co., 2034 Bannock St., Denver 23, Colo.

For more details circle 120 on Enclosed Return Postal Card.

Pin-Pad Boom Connections

Time saving on moves to new jobs and unfolding of the crane boom, together with complete flexibility and maximum safety, are cited by Koehring engineers when referring to the combination pin-pad boom connection now standard on Koehring 15, 20 and 45-ton crawler models and 25, 30 and 35-ton truck crane models. Lugs on the boom allow folding at any joint for transportation. The job determines whether the sections are pinned or bolted together, but in either case, the machined pads carry the heavy loadings.

In manufacture, every pad is ma-



Koehring's new 545 "Sprawler" Crane uses a pin-pad connected boom to lift a heavy 16-ton girder for a bridge near Savanna, Ill.

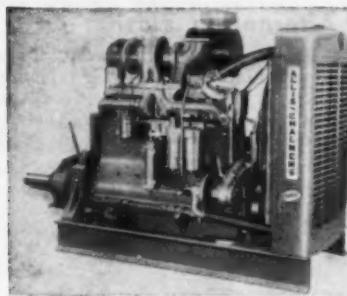
chined in a rigid fixture; then four pin-pod connectors are positioned in a massive jig and welded to the boom section. Because each boom section is handled in the same way, there is perfect alignment of the 4 drilled and reamed male-female pin connections and the 8 bolt holes.

Koehring Division, Koehring Company, 3026 W. Concordia Ave., Milwaukee 16, Wisconsin. (In Canada, Koehring-Waterous, Ltd., Brantford, Ont.)

For more details circle 121 on Enclosed Return Postal Card.

New Diesel Units

Two new heavy-duty diesel engines have been added by the Engine-Material Handling division of Allis-Chalmers Manufacturing Co. One engine, the 21000, is turbocharged and



New 340 hp Diesel

develops 340 hp at 2000 rpm. The other, the 16000, is a naturally aspirated engine developing 290 hp at 2000 rpm. Both are 6-cyl., 4-cycle, in-line engines with 5 1/4-in. bore, 6 1/2-in. stroke, 844 cu. in. displacement and 14.5 to 1 compression ratio. Basic weight of the engines is about 3000 lb., providing a weight-to-horsepower ratio of approximately 9 to 1.

A feature of the new engines is a new "two stage controlled turbulence" combustion. The initial "swirl" turbulence is produced on the intake stroke when in-rushing air is directed by positively located masks on twin intake valves. Second stage turbulence, or "swish," builds up as pistons near the top of the compression stroke.

Allis-Chalmers Manufacturing Co., Tractor Group, Milwaukee, Wis.

For more details circle 122 on Enclosed Return Postal Card.

Concrete Batch Plant

A new portable concrete batching plant, announced by Aeroil Products Co., is available in 3 1/2 and 6 yd. sizes. It can be powered by a gas engine or electric motor. The weigh hopper is made of abrasion resistant MAN-TEN steel and features a new easy way to introduce cement to the batch. A beam scale is standard equipment with dial scales offered as optional.

Mounted on four wheels, the plant is easily towed from one jobsite to another.



6-yd. Batch Plant in Working Position With Rear Wheels Removed

er. Total weight is 6,500 lb.

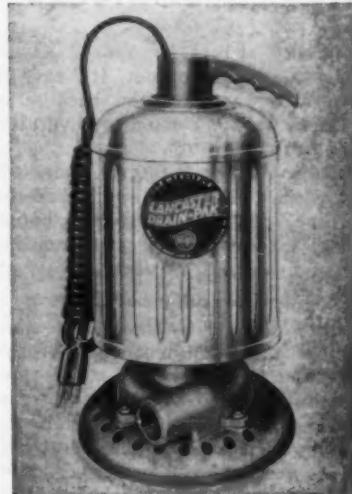
The conveyor is 55 in. long and has a high speed 24-in. belt. A belt wiper is used at the head end. 4-in. triple troughing idlers carry the belt with extra idlers provided at the loading point beneath the gate. Belt covers are available.

Aeroil Products Co., 7 Wesley St., South Hackensack, N. J.

For more details circle 123 on Enclosed Return Postal Card.

Submersible Sump Pump

A new submersible sump pump equipped with an all-bronze alloy motor housing has been introduced by Lancaster Pump & Manufacturing Co., Inc. This 100% moisture-proof motor case also actuates the automatic "On" and "Off" switch.



Lancaster Drain Pak

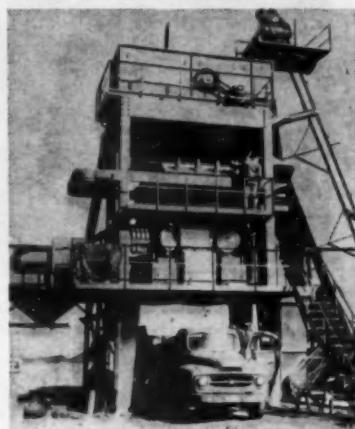
The Lancaster "Drain Pak" is available in two models—cast iron, cadmium plated, or all bronze. Both are equipped with the bronze alloy, 1/6 hp, 115-volt motor, also available in 230-volt and with three-wire cord set for ground connection. Capacity of the unit is 3,100 gal per hour against a 5 ft head, maximum head is said to be 20 ft.

Lancaster Pump & Manufacturing Co., Manheim Pike, Lancaster, Pa.

For more details circle 124 on Enclosed Return Postal Card.

Bituminous Plant

A 4,000 to 5,000 lb capacity plant has been added to the line of Auto batch bituminous plants of Pioneer Engineering. Designated the Model 5-B, this new plant is identical in design and operation to the Model 6-B (6,000-7,500 lb capacity) announced last year, the only difference being in the smaller size of several plant components. Among several outstanding features of the larger plant retained in the new 5-B model, are the fully automatic controls with inter-locking timer which are



Pioneer Model 5-B Bituminous Plant

stated to provide up to 15% greater output than similarly size-rated plants with conventional controls and also the quick-acting, twin discharge gates opening lengthwise of the pugmill.

The entire plant is designed for operation by electric motors with all on-plant wiring done at the factory. The total weight of the tower unit, including hot elevator is approximately 88,000 lb. Weight of the drier-dust collector units, (with fifth wheel on front and including electric motors) is approximately 47,000 lb.

Pioneer Engineering, Division of Poor & Co., Inc., Minneapolis 14, Minn.

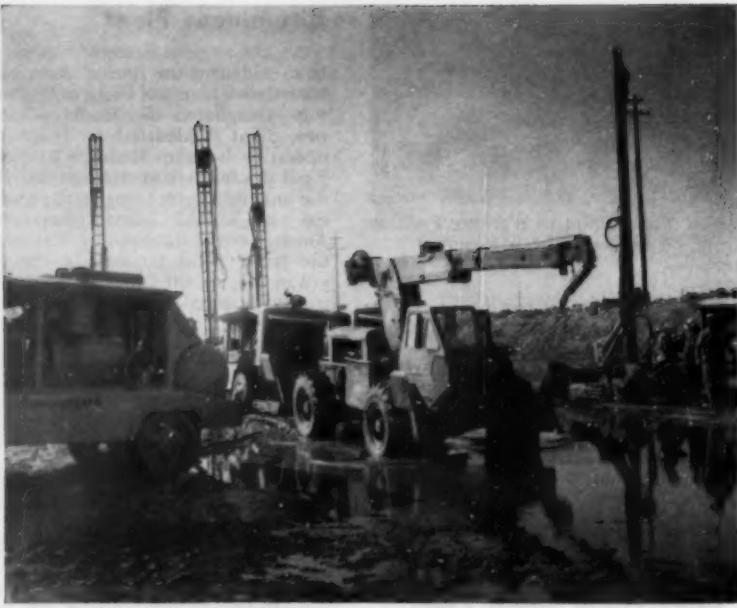
For more details circle 125 on Enclosed Return Postal Card.

Stabilizes Plant

A new, "Continuflo" design plant for production of stabilized road materials has been announced by Pioneer



Model 425 Stabilizer Plant



Muck and mire doesn't faze Austin-Western's powerful all-wheel drive hydraulic crane—shown here doubling in brass to tow heavy compressor-trailer on Niagara Power Project.

Austin-Western hydraulic crane . . . construction project workhorse

"We haven't got a single rig on the job that is more all-around useful and hardworking than the Austin-Western hydraulic crane." That's what Fred Sebastian, project manager for Gull and De Felice Construction Co., Niagara Falls, N.Y., says about the A-W crane.

"All-wheel steering gives it plenty of maneuverability to get in and out of the tightest places, yet it has enough speed to work fast in a large area. We work it double shifts and have never had any maintenance problems with it."

Handles, tows, totes and maintains
"It's a real workhorse on this job. We use it for everything . . . as a materials handling crane, to tow or tote, to maintain other equipment, and even as a back hoe."

"Our operators like it too. They seem to do a better job with equipment which they like and which

doesn't tire them out. It's easy to operate with precision because of instant response from the hydraulic controls."

The Austin-Western hydraulic crane is a versatile all-purpose 5-ton crane with 18-ft. telescoping boom. Full circle swing permits loading from front, rear or sides.

All-wheel drive and steering

All-wheel drive delivers plenty of power and traction for top performance under all surfaces and weather conditions. All-wheel steering permits an extremely short turning radius . . . maximum maneuverability. It is designed and built by Austin-Western to do more work with minimum maintenance.

Learn today why A-W crane owners are so enthusiastic about this versatile construction workhorse. Contact your nearby Austin-Western distributor or write us direct.

Austin 100th YEAR
ESTABLISHED BY PIONEERED **Western**
CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.
BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes
... for more details circle 281 on enclosed return postal card

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Engineering. Designated Model #425, the new plant consists of a basic unit to which auxiliary equipment may be added to provide either a stationary or portable set-up. This unit has a twin shaft pugmill with single speed drive, 350 g.p.m. centrifugal self-priming water pump with drive, water meter and spray bars, an operator's platform, and a mounting for the power unit, all supported on a heavy steel skid frame which will mount either on legs or on running gear for 5th wheel towing.

Several design improvements have been built into the Model 425 which make it different from any other existing plant according to the Manufacturer.

Pioneer Engineering, Division of Poor & Co., Inc., Minneapolis 4, Minn.

For more details circle 126 on Enclosed Return Postal Card.

Alternating Flasher

Two models of a heavy duty universal alternating flasher for operating emergency light, horns and bells are now being marketed by R. E. Dietz Co. model 65 is for 6-volt system; Model 125 for 12-volt systems.



Model 65 Universal Flasher

The new flasher is of the power relay type and is magnetically operated. It has a capacity of 15 amperes, DC current and in normal operation makes and breaks the electrical circuit 75 times per minute, for intermittent flashings of warning lights, blowing of horns or ringing of bells.

R. E. Dietz Co., Syracuse, N. Y.

For more details circle 127 on Enclosed Return Postal Card.

Hydraulic Hole Digger

A new unit, the Series DF-1 "Earth-Master," added to the line of McCabe-Powers Body Co., is stated to dig straight clean holes up to 10 ft. in depth and 20 in. in diameter, in practically any type of soil.

Standard auger furnished with the digger is equipped with a Pengo head having replaceable high-alloy steel points. Augers are available in sizes from 9-in. to 20-in. in diameter. Power is derived from a hydraulic pump driven by a power take-off installed on the truck transmission. Full-torque drive is available as optional equipment. Rotation is accomplished by a reversible hydraulic motor which drives





Series DF-1 "Earth-Master"

the digger through a chain and sprocket assembly.

McCabe-Powers Body Co., 5900
North Broadway, St. Louis 13, Mo.

For more details circle 128 on
Enclosed Return Postal Card.

Trenching Machine

A new, improved, one-man operated trencher, the Arps "Trench-Devil," Model M-A, has been announced. It can travel for short distances under its own power at $2\frac{1}{4}$ miles per hour. For long-distance moving, it can be easily skid-loaded on pickup trucks or small trailers.



Arps Trench-Devil, Model M-A

There are five digging widths— $2\frac{3}{4}$ in., $3\frac{1}{2}$ in., 4 in., 6 in., and 8 in., up to 54 in. deep. Digging speed is variable from 0 to 1,200 ft per hour in either direction. At the 2-ft depth, digging speed averages 250 ft per hour with an 8 in. width; a 4-ft depth produces 200 ft per hour at a 4-in. width.

A feature of the M-A is a reversible rubber-belted conveyor to deposit the dirt to either the left or right side of the trench. Conveyor can be changed to either side within 60 seconds.

Arps Corporation, New Holstein, Wisc.

For more details circle 129 on
Enclosed Return Postal Card.

Steel Guard Rail

A new steel guard rail has been announced by A. J. Bayer Co. It is available.
(Continued on page 145)



Austin-Western's exclusive front-end power gives a pulling assist to rear tandems for more power at the blade.

Power in front—steer in rear . . . Austin-Western does more work, speeds Michigan paving job

"Our two Austin-Western Super 88 graders do more work than any two competitive graders," says Louis Toccalino of G. Toccalino & Sons, Livonia, Mich.

"It's the only machine on the market that can do both close work and open road work, rough and finish grading, ditching and sloping . . . everything, equally well. And it has plenty of balanced power and traction for rugged work on any surface."

No downtime or maintenance problems

"One of our machines is a year old; we've had the other for 2 years. We've really kept them busy, but we haven't had any downtime or maintenance problems."

"The A-W combination of power in front and steer in rear really speeds construction. You can do work with an A-W that you wouldn't even consider attempting with other graders."

Austin-Western's exclusive front-end power means that every pound of the machine is alive and working . . . no dead-weight front ends on an A-W. All-wheel steering lets you steer the rear to move straight ahead; compensates for powerful sidethrust of a fully loaded blade.

Operators do more work, more easily

Operators like A-Ws because of the positive-action hydraulic controls that let them do so much more work better without getting tired out.

Ask for the full story now on this versatile tandem grader that does so much more work. Learn exactly why contractors like Toccalino in Michigan say, "We wouldn't buy any other machine for grading!" Contact your nearby Austin-Western distributor or write direct.

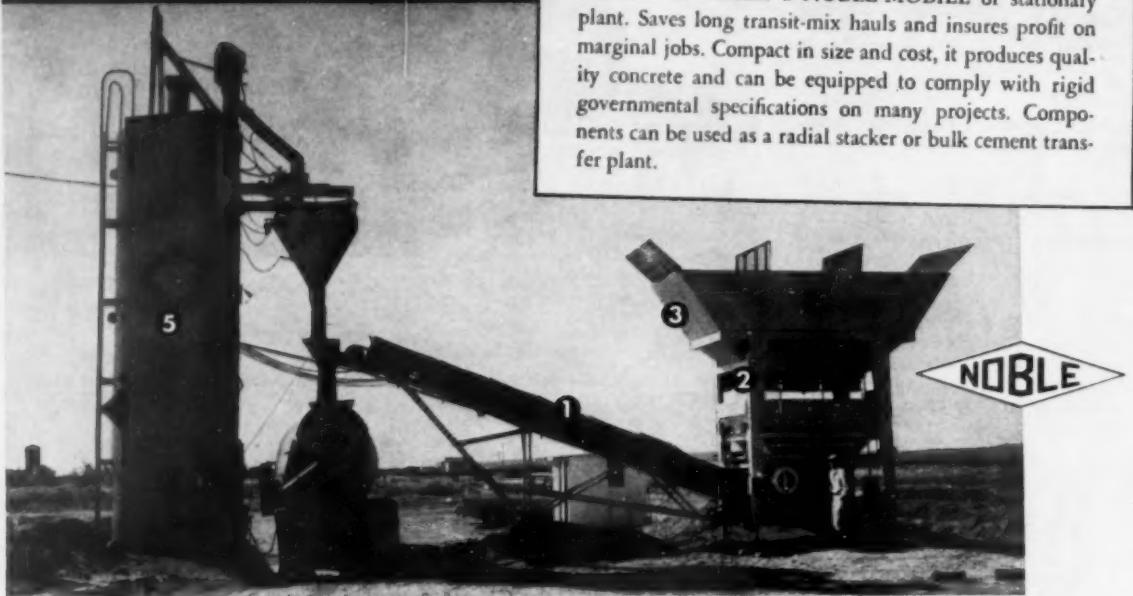
Austin Western

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes
... for more details circle 282 on enclosed return postal card



BATCH-A-BOUT ... biggest money-maker in the field earns its way every day in many ways



Easily and economically transported to job site on projects too small to warrant a NOBLE-MOBILE or stationary plant. Saves long transit-mix hauls and insures profit on marginal jobs. Compact in size and cost, it produces quality concrete and can be equipped to comply with rigid governmental specifications on many projects. Components can be used as a radial stacker or bulk cement transfer plant.

Your investment in a **BATCH-A-BOUT** can be as modest as you care to make it. With the basic components ... the aggregate weigh batcher, batch transfer conveyor and sack cement loading hopper ... you can enlarge the plant later to suit bigger jobs as your needs grow. In a step-by-step enlargement of the plant, you can add the 12 ton capacity overhead aggregate bin ; bin top extension complete with heap plates to 40 tons storage ; portable aggregate bin loading conveyor ; portable automatic cement batcher and storage silo Plant output varying from 30 to 75 cubic yards per hour easily attained depending on equipment used.

Write for Brochure
Noble Company
P. O. Box 1979
Oakland 4, Calif.

NOBLE COMPANY • 1860-7TH ST., OAKLAND, CALIF. • TEMPLEBAR 2-5785

Branches:

CLEVELAND 16, OHIO—20950 Center Ridge Road, Edison 1-4826
SEATTLE 9, WASHINGTON—518 First Ave., North, ATwater 4-4878
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DALLAS 35, TEXAS—2512 W. Mockingbird Lane, Fleetwood 7-1904
NEW YORK 17, N. Y.—52 Vanderbilt Ave., Oregon 9-6475
Export Distributor, Frazer International Corp., San Francisco

DISTRIBUTORS: BIRMINGHAM, ALA., Equipment Service Co., Inc. • PHOENIX, ARIZ., Western Machinery Co. • LOS ANGELES, CALIF., Smith-Booth-Usher Co. • DENVER, COLO., Western Machinery Co. • JACKSONVILLE, FLA., Graze-Dempsey Inc. • MIAMI, FLA., Neff Machinery, Inc. • CHICAGO, ILL., Arrow Contractors Equipment Co. • INDIANAPOLIS, IND., Flesch-Miller Tractor Co. • BOSTON, MASS., Hedge & Matthes Co. • DETROIT, MICH., R. G. Moeller Co. • ST. PAUL, MINN., Borcherding-Ingersoll, Inc. • BILLINGS, MONT., Seitz Machinery Co. • ST. LOUIS, MO., George F. Smith Co. • ALBUQUERQUE, N. MEX., Contractors Equipment & Supply Co. • SYRACUSE, N. Y., L. B. Smith, Inc. • STATESVILLE, N. C., Interstate Equipment Co., Inc. • CLEVELAND, OHIO, Wepco Equipment Co. • PORTLAND, OREG., Clyde Equipment Co. • HARRISBURG, PA., Highway Equipment & Supply Co. • PITTSBURGH, PA., Equipment & Supplies, Inc. • NASHVILLE, TENN., Pearson Machinery Co. • DALLAS, TEX., Lumber Machinery Co. • EL PASO, TEX., Border Machinery Co. • HOUSTON, TEX., Pearce Equipment Co. • SAN ANTONIO, TEX., Girard Machinery & Supply Co. • SALT LAKE CITY, UTAH, Arnold Machinery Co. • SEATTLE, WASH., Star Machinery Co. • SPOKANE, WASH., Western Machinery Co. • CASPER, WYO., Studebaker Tractor & Equipment Co., Inc. • CALGARY, ALB., Precision Machinery & Equipment, Ltd. • VANCOUVER, B. C., Westcoast Equipment, Ltd. • WINNIPEG, MAN., Huggard Equipment Co., Ltd. • TORONTO, ONT., Ontario Equipment & Supply, Ltd. • MONTREAL, QUE., Laurentide Equipment Co., Ltd. • OMAHA & NORTH PLATTE, NEB., Construction Service Equipment Co.

... for more details circle 337 on enclosed return postal card

New Products

(Continued from page 143)



"Hi-Guard" Steel Guard Rail

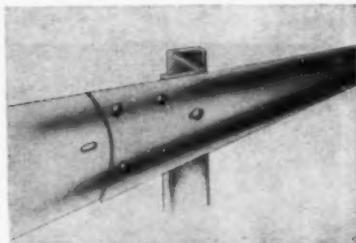
able in standard lengths, either single or double rib and also in special lengths with special hole punching, finish and forming to special radii when specified. Spring type or flush mount brackets are standard equipment. End pieces are designed with no sharp or protruding areas. Rail sections can be mounted on either concrete, steel or wood anchor posts. Replacement of standard sections is fast and easy, according to the manufacturers.

A. J. Bayer Co., 2900 E. Slauson Ave., Los Angeles 58, Calif.

For more details circle 130 on Enclosed Return Postal Card.

Shallow Beam Guard

A newly designed, low-cost, easy-to-erect and maintain shallow beam guard rail for secondary highways and commercial use is offered by Syro Steel Co. It is available in 9 and 12 gauge metal.



Syro Guard Rail

Shop curved uniformity and pre-fitted drilled holes and slots mean quick, labor-saving erection. Maintenance is also less expensive because superior finish (phosphatized [equal to bonderizing] baked-on, rust-inhibitive lead chromate) lasts longer.

Syro Steel Co., Girard, O.

For more details circle 131 on Enclosed Return Postal Card.

Trencher

The new "Laster" trencher, a tractor attachment, will dig a 4 ft. trench at speeds up to 500 ft. per hour, according to Deltec, Inc., the maker. An "incher" device moves the tractor forward at the correct rate of speed to allow the adjustable, high carbon, abrasion resistant steel cutters to dig trenches from 6 to 14 in. wide. Soil is conveyed



The Laster Trencher

to the right of the cut with a screw type earth mover. A boom extension is available for deeper trenching. Weighing approximately 700 lb., the trencher can be operated off of any wheel type tractor with a live power take-off, ASAE standard 3-point hitch.

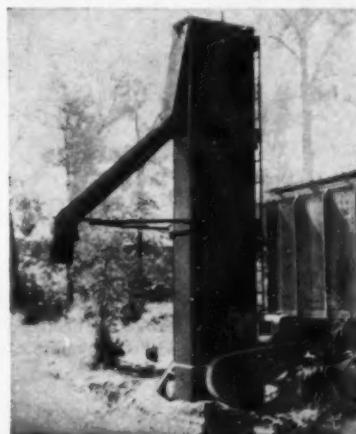
Deltec, Inc., Laster Trencher Road, Youngstown 9, Ohio.

For more details circle 132 on Enclosed Return Postal Card.

Bulk Cement Transfer

A new 500 bbl per hour capacity bulk cement transfer plant, introduced by C. S. Johnson Co., is designed to require a minimum of maintenance.

Bulk material is carried from the bottom of the hopper car by a 12-in. diameter screw conveyor. A 4-in. pitch,



C. S. Johnson Bulk Cement Transfer Plant

all-steel elevator chain has ground and heat-treated alloy steel pins and hardened knuckles. The 22 x 50 in. steel elevator casing has a built-on ladder for access to takeups and grease fittings at the head.

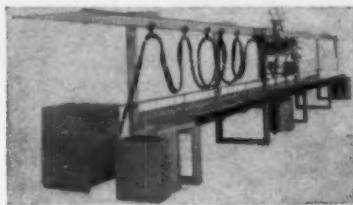
Power for the screw conveyor and elevator is furnished by a gasoline engine with clutch takeoff, or an optional 10 horsepower, 220/440 v. electric motor.

C. S. Johnson Co., Champaign, Ill.

For more details circle 133 on Enclosed Return Postal Card.

Track-Link Welder

A new low cost track-link rebuilding machine, the model TLM-2 is now available. Important features claimed for the machine include: Two wire feed units for welding both links simultaneously, thereby doubling the rod deposit and decreasing welding time.



Model TLM-2 Welding Machine

An electronic eye and the accompanying patterns that materially decrease set-up time, and offer positive intermittent welds as required for rebuilding track-links. A single welding console enclosing two 500-AMP, 100% duty cycle, 3 phase, constant potential, welding supplies. Flux handling and dispensing equipment for rapid handling of welding flux.

L & B Welding Equipment, Inc., 2424 6th St., Berkeley, California.

For more details circle 134 on Enclosed Return Postal Card.

Convertible 3-Axle-2-Axle Tandem Roller

The inclusion as standard equipment of a hydraulic lifting cylinder for the walking beam has given the Buffalo-Springfield KX-25E, 3-axle 13-ton tandem roller additional versatility, both in operations and in job applications.



Buffalo-Springfield KX-25E Roller

With the hydraulic lifting cylinder it is no longer necessary to depend on the terrain to position the walking beam (carrying the end guide roll) in the desired locking position. The operator

can now raise or lower the beam at will.

The roller, with the center roll raised, can be used as a 12-20 ton, 2-axle tandem. Long wheelbase arrangement offers the conventional 2-axle tandem weight distribution of one-third of the total weight on the steering roll and two-thirds on the drive roll.

By raising the end guide roll and by controlling the amount of ballast in the rolls, the KX-25E can become a 2-axle tandem that puts equal compression on both rolls in contact with the surface being rolled.

Hydraulic lifting cylinder kits are available to permit the attachment of this new feature to machines that are now in the field.

Buffalo-Springfield Roller Co., Division of Koehring Co., 1210 Kenton St., Springfield, Ohio.

For more details circle 135 on Enclosed Return Postal Card.

Power Earth Drill

A new power earth drill, introduced by General Equipment Co., is stated to drill an 8-in. hole $2\frac{1}{2}$ ft. deep in less



General Power Earth Drill

than 30 seconds. The unit is powered by a $2\frac{1}{2}$ -hp Clinton air-cooled engine, with automatic rewind starter. A precision built centrifugal clutch engages automatically when the throttle lever, which is mounted on the handle, is pressed . . . and disengages when the throttle is released, stopping the drill while the engine idles. The drill weighs 29 lb.

General Equipment Co., Owatonna, Minn.

For more details circle 136 on Enclosed Return Postal Card.

Tire Safety Inflation Cage

Positive protection of the man inflating truck tires is claimed for the Branick Truck Tire Safety Inflation Cage here pictured. The device is pres-



The Branick Cage with Tire.

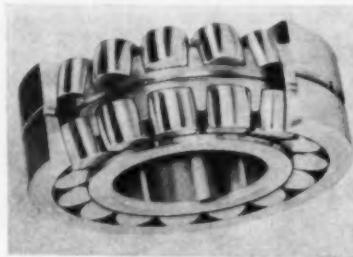
sure-tested to withstand the terrific exploding force behind the lock ring. It takes any tire up to $56\frac{1}{2}$ in. high and $17\frac{1}{4}$ in. wide. Larger tires may be leaned against outside of cage while the service man inflates the tire safely from inside the cage.

Branick Manufacturing Co., Box 1937, Fargo, N. Dakota.

For more details circle 137 on Enclosed Return Postal Card.

Spherical Roller Bearings

Three major design improvements have been combined to produce the highest capacity spherical roller bearings yet developed, according to Link-Belt Company. These features are: maximum diameter and quantity of convex rollers for each bearing size; precision machined centrifugally cast



Direct Shaft Mounted Spherical Roller Bearing

bronze retainers, and high, heavy inner race shoulders. The new bearings are being introduced initially in bore sizes ranging from 1.5748 in. to 11.0236 in. with dynamic load ratings up to 288,000 lb. They also will be available in pillow blocks in bore sizes ranging from $1\frac{7}{16}$ in. to 10 in.

Link-Belt Company, Prudential Plaza, Chicago 1, Ill.

For more details circle 138 on Enclosed Return Postal Card.

Automatic Blade Control

A new transistorized automatic blade control for Caterpillar No. 12 and No. 112 motor graders is said by the maker, Preco Incorporated, to be considerably faster than the original vacuum-tube type. Like the former unit, the blade control automatically



Control Panel of New Control

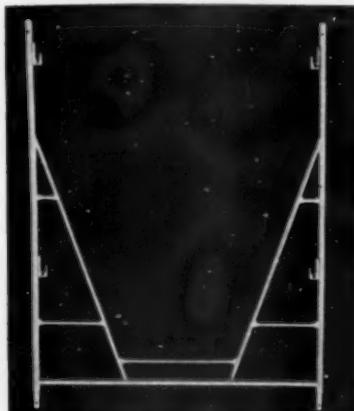
holds the cutting edge of the blade at the desired transverse slope. But with the new control, correction of any error in blade position is made while the motor grader has traveled less than six inches, with the control holding the transverse slope of the blade to within $\frac{1}{8}$ in. in its entire width, or to an accuracy of $1/10$ of 1 per cent.

Preco Incorporated, 6300 E. Slauson Ave., Los Angeles 22, Calif.

For more details circle 139 on Enclosed Return Postal Card.

Scaffold End Frame

A new, lightweight, shallow-trussed end frame has been developed by The Patent Scaffolding Co., Inc., for use in erecting sectional steel scaffolding on construction jobs. Designated the O3CS end frame, the unit is constructed of standard size tubing, measures 5 ft. wide and 6 ft. 6 in. high, and is completely interchangeable with the manufacturer's other scaffolding frames and diagonal braces. It is equipped with a sprocket riveted in each leg and is available for use with or without



Lightweight End Frame

(Continued on page 149)



Contractors: J. J. Welcome & Sons Construction Company, Redmond, Washington

Double-barreled culvert on Washington's U.S. 101...

they chose concrete pipe for maximum strength under 30' overburden

Built to Washington State Highway Department specifications, twin lines of 48" extra-strength reinforced concrete pipe carry the heavy load of the high fill. And resistance of the concrete to the overburden will increase. Concrete is the one material that actually continues to gain strength year by year.

Moderate in cost, concrete is always readily available to save you time and dollars. On this Washington job, the concrete pipe was produced in Olympia just ten miles away.

And for long-term economy—nothing else lasts like concrete. There's high resistance to abrasive wear. Concrete can't rust. And

smooth pipe walls assure maximum flow.

Today, engineers everywhere are solving their difficult pipe problems with concrete—for pipe lines of all kinds.

PORLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of concrete



... for more details circle 339 on enclosed return postal card

Makes 230' lifts using new tubular frame boom

WHIPPING, LAGS AND BACKLASH
ELIMINATED...MORE LIVE LOAD
CAPACITY—LESS DEADWEIGHT

A new type of crane boom — mounted on a Manitowoc 60-ton Model 3900 crane — is doing a spectacular job for the John F. Beasley Construction Company, setting steel at heights up to 230'. The job involves all the steel work for a new bridge to carry U. S. Highway 212 over the Missouri River between La Plant and Gettysburg, South Dakota. ■ Constructed of high-strength tubular steel, the new boom is considerably lighter in weight than conventional booms. Although 200' long, (without 30' jib) it weighs 25% less than standard booms as short as 150'. Therefore, it can handle substantially greater live loads because of less deadweight of its own to support. ■ Operator O. K. Bean reports: "I never have trouble with boom whipping now, even when carrying heavy loads high up... and I can boom out further without danger of overloading the crane. We can still locate the 'iron' exactly on the bolt hole the first time... with no lags or backlash." ■ For specialized jobs like this or everyday jobs, you can depend on outstanding crane or excavator service from Manitowoc — check with your distributor soon!

Manitowoc

MANITOWOC ENGINEERING CORP.

(A subsidiary of The Manitowoc Company, Inc.)

MANITOWOC, WISCONSIN

CRANES

25 TON - 100 TON

SHOVELS DRAGLINES TRENCH HOES

1½-YD. - 8½-YD. 1½-YD. - 6-YD. 1½-YD. - 3-YD.

... for more details circle 335 on enclosed return postal card

New Products

(Continued from page 146)

patented "Slideloks" for securing diagonal braces to the frame. Sidewall brackets can be used on the frames to provide three working levels.

The Patent Scaffolding Co., Inc., 38-21 Twelfth St., Long Island City 1, N.Y.

For more details circle 140 on Enclosed Return Postal Card.

Tractor Cabs

Five new cabs, designed expressly for the newest Cat wheel-type tractors, including DW21, DW20 and DW15, are now being offered by Crenlo, Inc.



Standard Cab for Caterpillar DW20

Both standard and heavy duty cabs are available for the DW20 and DW21. The standard is built from 12 and 16-gauge material, while the "Super" has many heavier sections including 14-in. steel plate roof and $\frac{3}{8}$ -in. rear panel for extra protection from falling objects.

Crenlo, Inc., Rochester, Minn.

For more details circle 141 on Enclosed Return Postal Card.

Sheave Blocks

Forged alloy steel construction of all major parts except the wheel and a new opening mechanism are major features of a new line of sheave blocks by Joy Manufacturing Co.

The forged parts not only provide ruggedness to prevent shattering, cracking and springing of side plates but also are a safety feature. Under extreme overloads, the hook will not snap off; but when overloaded at three times rated capacity it will begin to straighten and conditions can be remedied. The block is opened simply by turning the hook 90° and pushing it aside. This design eliminates toggle pins, chains, bolts, nuts and cotter pins.

Joy Manufacturing Co., Henry St., Oliver Bldg., Pittsburgh 22, Pa.

For more details circle 142 on Enclosed Return Postal Card.

Centrifugal Pumps

A new line of self priming, high head centrifugal pumps in sizes $1\frac{1}{2}$ in. through 6 in. has been announced by Rice Pump & Machine Company.



Rice Pump

These pumps are available with base mounting, pneumatic tires or steel wheels. Units may be belt driven, flexible coupling driven or direct-connected engine driven. Sizes $1\frac{1}{2}$ in. through 3 in. are available with electric or air-cooled gasoline power, sizes 4 in. through 6 in. with electric, gasoline or diesel power.

Rice Pump & Machine Co., Belgium, Wis.

For more details circle 143 on Enclosed Return Postal Card.

Triple-Axle Trailer

A new heavier duty triple-axle has been added to the Haulette line. It has load capacities up to approximately 16,000 lb.



Haulette model 12001-3

The new model Haulette 12001-3 has a shipping weight of 2,600 lb.; overall length, with the 3 ft. 9 in. double folding ramps up, is 18 ft.; effective bed of trailer is 12 ft. long, with a width of 6 ft. 6 in.

The unit features all-steel construction and Fayette's patented equalizer bar design and individually sprung-mounted wheels for even, level towing.

Fayette Manufacturing Co., Haulette Division, Morenci, Mich.

For more details circle 144 on Enclosed Return Postal Card.

Overhead Bin

The newest member of the Ross Porta-Plant line of portable concrete batching equipment is a portable 3-compartment overhead bin. The new unit is designed for use with either the 4-yd. or 6-yd. Ross Porta-Plant. The compartment overhead bin is said to



3-compartment bin

be a highly-maneuverable unit and comes complete with wheels and axle for legal highway travel.

Ross Company, Box 446, Brownwood, Texas.

For more details circle 145 on Enclosed Return Postal Card.

Curb Turf Edger

A new tractor-drawn "Kurb-Dresser" produced by K-D Manufacturing Co., is claimed to edge up to 80 miles of turf daily. It can be mounted in minutes behind any tractor having a three-



K-D "Kurb-Dresser"

point hitch. When trimming turf overlying curbs or sidewalks, the unit's cutting blade automatically holds a steady course even when the tractor path deviates as much as 16 in. It will either flush-cut adjacent to curb, or will cut-and-trough simultaneously, permitting a trough 1 in. wide and 4 in. deep.

K-D Manufacturing Co., Cleburne, Tex.

For more details circle 146 on Enclosed Return Postal Card.

Bulldozer Edges

Introduction of multi-section bulldozer edges for D8 and D9 angling and straight dozers is announced by Caterpillar Tractor Co. The edges, formerly available in one-piece units, are now obtainable in one or two-piece units of $\frac{3}{4}$ in. and 1 in. thickness for most No. 8A and No. 8S bulldozer blades. Standard $1\frac{1}{4}$ -in. edges for all No. 9A and No. 9S blades may be purchased in either one or three-piece design. Said to be easier to handle than the one-piece edges, the new multi-section edges weigh less than 200 lb., can be transported in a light truck and in-

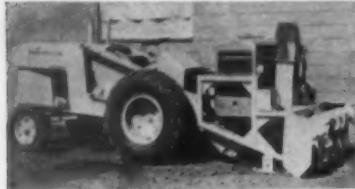
stalled by a 2-man team without the use of special hoist equipment.

Caterpillar Tractor Co., Peoria, Ill.

For more details circle 147 on Enclosed Return Postal Card.

Rotary Snow Plow

A new model of the Ram two-auger snow plow has been introduced. This all-steel welded snow plow is attach-



Ram Two-Auger Snow Plow

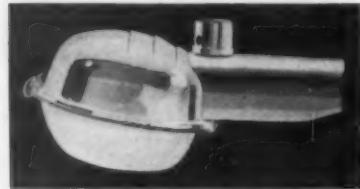
able to front end loaders. It is powered by a 4-cylinder Hercules GO-226 gasoline engine, developing 87.5 hp at 3,200 rpm and maximum torque of 182 foot pounds at 1,400 rpm.

Ram Equipment Co., Minneapolis, Minn.

For more details circle 148 on Enclosed Return Postal Card.

New Luminaire

A new luminaire for street, highway, and parking lot usage has been announced by Wheeler-Fullerton Lighting Division. To be known as the "Metropolitan," its luminaire utilizes



"Metropolitan" Luminaire

either clear or color-improved 100, 175 and 250-watt mercury lamps. It is available with IES-ASA Type I, Type II and Four-way Type II—distribution patterns.

Wheeler-Fullerton Lighting Division, Wheeler Reflector Co., Boston 10, Mass.

For more details circle 149 on Enclosed Return Postal Card.

Black Top Paver

A new Model 200 black top paver, having new features has been announced by Trac-Machinery Corp. Chief among improvements is the redesigned hopper which features larger carrying capacity and hydraulically operated folding sides to feed material to center conveyor opening. The hopper is 10 ft. wide in open position and 8 ft. wide when raised or folded.

Other advancements include: increased power provided by a new 6-cylinder engine which is rated at 59 hp at 1800 rpm; increased traction accom-



New Model 200 Trac-Paver with Hopper in Folded.

plished by moving the front wheels forward under the hopper, thus shifting more weight on the rear drive wheels; and additional extensions which permit increasing paving width to 12 ft.

Trac-Machinery Corp., Nunda, N. Y.

For more details circle 150 on Enclosed Return Postal Card.

Flasher Bracket

Designed to accommodate Dietz "Visi-Flash" transistorized hazard-warning flashers, this welded heavy-gauge protective mount is said to be both theft-proof and impact-resistant. The bracket is mounted by four screws, with positioning ledge flush along top



Dietz Flasher Bracket

of wooden barricade. Once the flasher unit is inserted, these mounting screws are inaccessible. A field-tested tamper-proof bolt, available in lengths of $\frac{1}{2}$ in., $1\frac{1}{2}$ in., or 2 in., securely anchors the flasher battery case inside the bracket. The mount will accommodate Dietz models 600, 604 and 620.

R. E. Dietz Company, 211 Wilkinson St., Syracuse 1, New York.

For more details circle 151 on Enclosed Return Postal Card.

Small Truck Crane

The "Handilift", a new, hydraulically-operated, truck-mounted crane for handling "medium-light" loads, is easily mounted on any truck, including light "pick-ups". It can be placed directly behind the cab, in the middle of the bed, or on the rear of the truck.



The "Handilift" Crane for Small Trucks

Lift capacity is 650 lb with the regular 7-ft boom, or 450 lb with a 10-ft boom.

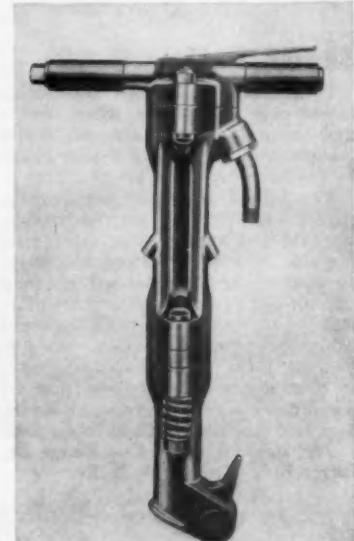
This crane is offered as especially suited to the safe and economical loading and unloading of materials and equipment items that otherwise would require several men to handle—paving forms, barrels of paving compound, drums of oil, etc. It takes in up to 16 ft of line by means of an hydraulic winching cylinder inside the boom. A second heavy-duty cylinder tilts the boom up and down. An optional hydraulic unit is available to swing the boom—or the boom can be swung manually. Crane can be operated with truck P.T.O. or by an auxiliary engine.

Teale and Company, P. O. Box 306, Omaha, Nebr.

For more details circle 152 on Enclosed Return Postal Card.

New Paving Breaker

The Davey-Holman Model SS-32 medium weight paving breaker is announced as having an extremely high power-to-weight ratio and as suitable for all but the heaviest demolition jobs. An outstanding feature is the complete housing by the cylinder of the entire valve mechanism. A single hat-shaped, short-travel main valve controls the high speed piston. Handle is fitted with an outside type trig-



Davey-Holman SS-32 Paving Breaker

ger, and throttle valve has a replaceable leak-proof rubber seating. Main

(Continued on page 154)



***When it's unhandy to position
Hard-Face it where it sits!***

***Low Cost STOODY 1030—the rod that simplifies
hard-facing jobs—in field or shop!***

POSITION WELDING—Here's a new Stoody Hard-Facing Rod for use on big equipment—parts that can't be positioned readily for welding! Stoody 1030 is easy to weld either vertical or downhand. The arc is smooth and stable with little smoke and low spatter. Runs AC and DC. Welds to carbon steel, manganese steel and weldable cast iron.

LESS WORK—With Stoody 1030 there's no slag to chip, deposits are bright and clean—ready for multiple passes and high buildups, if required.

HIGH WEAR RESISTANCE—Users who know hard-facing metals know that high alloy content is the key to more wear resistance. With 11.3% chrome,

Stoody 1030 surpasses everything in its price class!
This means longer wear per hard-facing dollar!

For high deposition rates, *more actual pounds laid down per hour...* for a *long lasting alloy at a low price* try Stoody 1030! It's available from any Stoody Dealer. Check the Yellow Pages of your phone book or write direct to the company. Literature available.

STOODY COMPANY

11908 East Slauson Avenue • Whittier, California

... for more details circle 347 on enclosed return postal card

LOW SLUMP CONCRETE

delivered consistently by SMITH truck mixers

SMITH'S exclusive "T" blade lifts...

material out of the mass . . . the mixing fin pours material into the center of the drum . . . it's the "T" that mixes to the test . . . there is no segregation in the mix.



Ordinary "L" blade can't mix or pour efficiently . . .

because material slides off the blade as it comes out of the mass . . . there is no mixing fin to lift material into the center of the drum . . . churning instead of mixing action results.



discharges (low slump) concrete faster than any other truck mixer!

Actual job site data on yardage and discharge times available on request.



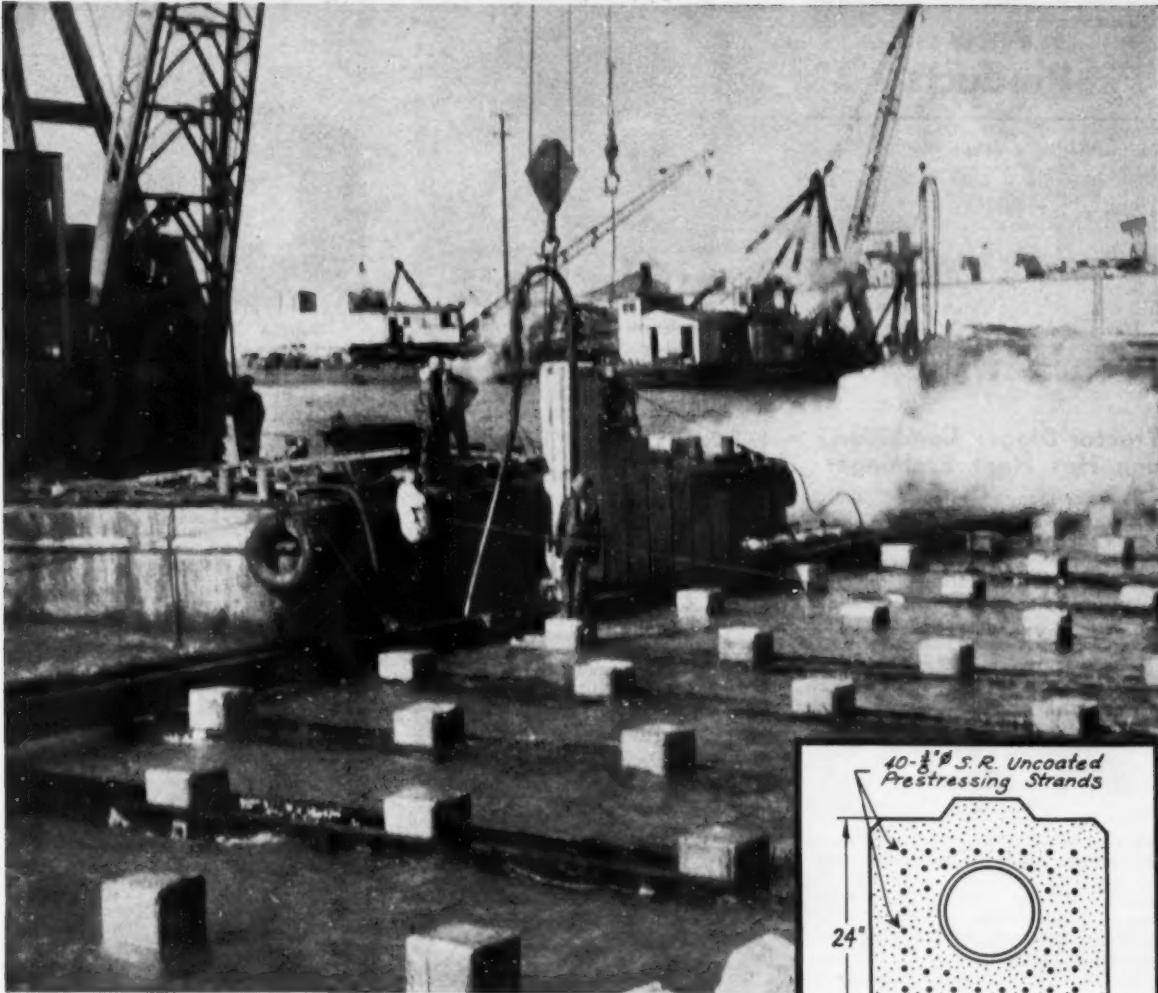
Since 1900, the pioneer designer and foremost manufacturer of the world's finest mixers

THE T. L. SMITH COMPANY • Milwaukee, Wisconsin • Lufkin, Texas

Affiliated with Essick Manufacturing Company • Los Angeles, Calif.

... for more details circle 380 on enclosed return postal card

Here piles are being driven through a template to assure proper alignment and fitting.



Prestressed Concrete Piles For C&O Railway Bulkhead

Part of the new Chesapeake and Ohio Railway facilities at Newport News, Virginia, is a 650 ft long bulkhead and relieving platform. Built by the Tidewater Construction Corporation of Norfolk, Virginia, it consists of interlocking prestressed piles 63 ft long and 24 inches square. These function simultaneously as sheet and bearing piles. In addition, some 453 bearing piles 20 inches square and varying in lengths from 60 to 65 ft are going into the finished project.

Among the benefits of prestressed piles—currently being taken advantage of by many State Highway Departments and State Maritime Commissions are: ease of handling and the ability to withstand driving shocks without cracking. Prestressed piles can be easily carried by attachments at one or two points on the pile, while other concrete piles of like dimensions would require three or four lifting points. Most important, prestressed piles can withstand severe driving conditions without cracking or spalling. This quality results

in a crackless pile which is consequently impervious to freezing and thawing.

The great and practical economies of prestressed concrete in all manner of construction are values that designers and builders the country over are enjoying with increasing frequency. John A. Roebling's Sons Corporation, right from the introduction of this method in this country, has done important and informative work on all its phases; design, prestressing elements, casting beds and development of prestressed strand. We invite inquiries of any "prestressed" nature and will be happy to enlarge your knowledge and work with you in every way possible. Please address your requirements to Construction Materials Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

... for more details circle 342 on enclosed return postal card



New Products

(Continued from page 150)

valve assembly is held rigidly in the cylinder by a rubber buffer which is said to eliminate much of the vibration common to air tool operation. The SS-32 weighs 60 lb, is 22½ in. long; has a bore of 2 inches, a stroke 5 inches, and delivers 1,250 blows per minute.

Davey Compressor Co., Kent, Ohio.

For more details circle 153 on Enclosed Return Postal Card.

Tractor-Digger Combination Has Heat Exchanger

The Sherman F-8 "Panther" Power Digger, Model 1128, is now available for mounting on Models 1821 and 1841 of the Ford Industrial Tractor just introduced. A feature of the combination is the use of an independent electric fan-cooled heat exchanger that serves the "married" Industrial-Univer-



Location of Heat Exchanger is Shown by Grill in Front of Digger Controls

sal and Sherman Digger hydraulic system by neutralizing such detrimental factors as extremely hard digging, high atmospheric temperatures and sun heat radiation. The exchanger is equipped with a 6-volt motor, with a resistor added to the electrical system when the digger is installed on a tractor with 12-volt circuit.

Sherman Products, Inc., Royal Oak, Mich.

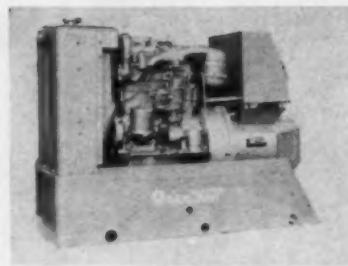
For more details circle 154 on Enclosed Return Postal Card.

10 and 15 KW Electric Plants

Series DZB generating plants are announced by D. W. Onan & Sons in either 10,000 or 15,000 watt AC size ranges and in all standard 60 and 50 cycle voltages to 460 volts.

Completely self-contained, these new diesel-driven generating sets are designed to provide primary power for contractors, oil fields, resorts or other users where a dependable, continuous source of electricity is needed, and for all types of emergency standby where low-volatile diesel fuel is preferred over gasoline.

Controls on both models are located in a cabinet mounted on top of the generator. Included are a battery charge rate ammeter, water tempera-



The New Onan DZB 10 KW Generating Plant

ture gauge, oil pressure gauge, high-water temperature cutoff, momentary start-stop switch and output terminal block. Optional accessories include weatherproof housings, meter panels with necessary instruments, batteries, and fuel lines with fittings.

D. W. Onan & Sons, Inc., Minneapolis, Minn.

For more details circle 155 on Enclosed Return Postal Card.

New Loader for Tractors

Introduction of an all-new, heavy duty type loader for Ford and Ferguson tractors, is announced by Freeman Loader Corporation. Known as Model



Freeman's Model M-601

M-601, the new loader has capacity to lift 1,200 lb. to a height of 8½ ft. (to bottom of bucket). Ease of attaching to tractor and removing are features, and no removal of tractor lights is necessary. The 9-cu. ft. bucket (combined with gravel plate) is full 40-in. wide and has bolted-in 1½-in. axle steel teeth.

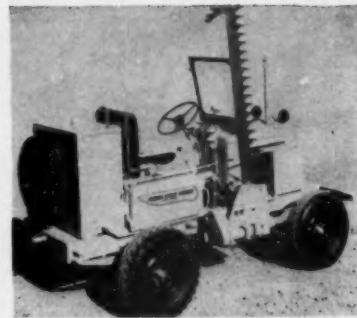
Freeman Loader Corp., Peru, Ind.

For more details circle 156 on Enclosed Return Postal Card.

Highway Mower

The new Topeka "Forty Mile Mower" is not a tractor attachment but a completely integrated machine designed for efficient mowing and also for spraying. The latter function is accomplished through a fast on-and-off attachment which enables the machine to apply weed-killing chemicals at the same time that it mows.

The heavy channel frame construction permits the use of a front end loader for stock pile work. One man can attach or remove the hydraulic mowing mechanism in ten minutes.



Topeka "Forty Mile Mower"

The mower has road travel speeds of 40 to 45 miles an hour. Mowing speeds are from 1 to 10 miles an hour. The slower speed is stated to make it possible to cut green, woody vegetation that stops many mowers.

Topeka Hiway Mower, Inc., 700 E. 8th St., Topeka, Kans.

For more details circle 157 on Enclosed Return Postal Card.

New Plastic Traffic Cones

A complete line of "Traficones", adapters, and accessories made of poly vinyl chloride (plastic) is now available in all three standard sizes—12 in., 18 in., and 28 in. Heavily constructed



One of the New "Traficones"

and designed to resist greater wind velocities, these tough, flexible plastic units will withstand the rough wear and abuse required in continuous daily service. Permanent pigments are incorporated throughout the compound, producing brilliant red and yellow colors. No painting or maintenance is required.

Interstate Rubber Products Corp., 908 Avila St., Los Angeles 12, Calif.

For more details circle 158 on Enclosed Return Postal Card.

Snow Attachment for Front End Loader

A new snow attachment that converts any 66-in. or 72-in. wide Anderson model E front end loader to a

snow bucket has been announced. Quickly attached by eight bolts, the extension provides the extra capacity required for snow removal without interfering with normal loader operation. Even with the snow attachment in place, the loader can be used for handling salt, sand and other materials. High bucket clearance is assured as well as full dumping.

A. C. Anderson, Inc., Dept. 142, Wildwood, N.J.

For more details circle 159 on Enclosed Return Postal Card.

White Reflective Liquid

A new white "Codit" brand reflective liquid which can be brushed, rolled, or sprayed on rough or porous surfaces to make them brightly visible at night has been announced by MMM.

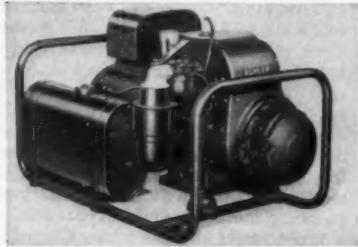
This reflective liquid (No. 7216) is white by day, blending inconspicuously with concrete and other light-colored backgrounds such as bridge abutments, curbs, fence posts and road delineators. At night it vividly reflects the lights of approaching cars to make the object visible to drivers.

Minnesota Mining and Manufacturing Co., Dept. K8-377, 900 Bush Ave., St. Paul 6, Minn.

For more details circle 160 on Enclosed Return Postal Card.

Electric Plants

Two new high frequency electric plants have been introduced by Kohler Co. They are Model 2.5MV35, a 2500 watt, 180 cycle, 3 phase, 230 volt, AC, 115 volt DC; and Model 2.5MV35, a 2500 watt, 180 cycle, 3



New Kohler Electric Plant

phase, 115 volt, AC, 115 volt DC. Both models include recoil starter, 2-gal. fuel tank, mechanical fuel pump with fuel filter and shut-off valve, oil bath air cleaners, vibro mounts, 2 twist-lock AC four-prong receptacles and 1 twist-lock DC two-prong receptacle, as standard equipment.

Kohler Co., Kohler, Wis.

For more details circle 161 on Enclosed Return Postal Card.

"Men Working" Sign

A new warning sign marketed by T. J. Cope Division, balanced vertically and allowed to swing, will withstand extremely high winds. The legs are of



Warning Sign Type B

angle iron $1\frac{1}{4}$ in. x $1\frac{1}{4}$ in. x $\frac{1}{8}$ in. After galvanizing, assembly is done with stainless steel rivets and brass screws. The yellow panel is 18 in. x 18 in. with black letters 5 in. high. Also provided is a flag holder of iron pipe. The sign folds into a flat unit for easy transport. It weighs 25 lb.

T. J. Cope Division, Rome Cable Corp., Collegeville, Pa.

For more details circle 162 on Enclosed Return Postal Card.

Asphalt Mixer

A new asphalt mixer, with twin shaft shanks and tips arranged for spiral "run around", has been announced by the Bolland Division of Colonial Iron Works. It is said to be notable for its closely knit mix and batch uniformity. There are 16 possible adjustments of the high chromium alloy tips. The same alloy in gates and liners minimizes abrasive damage.

The gate is adjustable up and down for wear. It is activated by either steam or air under push button control, and will dump a load in 4 seconds. Hinged vertical sides and removable ends provide easy access to all internal parts. End collars inside the mixer are split and dove-tailed so that they can be removed without removing shafts.

Batches are kept hot throughout the mixing cycle by the 4 jackets on the outside surface of the shell. Each mixer can handle batches 5 to 10% in excess of its rated capacity. Mixers are constructed in 3, 4, 5, and 6 thousand pound batch capacities. The units are said to be easily adaptable to any tower construction.

Bolland Asphalt Plant Division, Colonial Iron Works, 17625 St. Clair Ave., Cleveland, Ohio.

For more details circle 163 on Enclosed Return Postal Card.

Rust Protection

A new product, "Rust-Kon-Trol," now being introduced nationally, is

claimed to offer lasting protection against rust on any type of metal. Tests are stated to have proven one application will give permanent rust protection indoors and an entire year of complete protection outdoors.

Packed in an 11-ounce pressurized can, it is quick and easy to use. Another advantage claimed is that no surface preparation is required for its use. Its waterproof formula is not affected by the weather, it cannot harm or discolor ferrous or non-ferrous metals, and is also harmless to wood surfaces.

Wilco Co., Industrial Division, 4425 Bandini Blvd., Los Angeles 23, Calif.

For more details circle 164 on Enclosed Return Postal Card.

Tire Valves

A complete line of tube and tubeless tire valves for off-the-road equipment is announced by the Dill Manufacturing Company. Included are rubber base type valves, screw-on repair tube valves spuds for tubes, air-water valves, tubeless valves, and a complete group of valve extensions for rubber base or screw-on repair valves.

Dill Manufacturing Co., 700 East 82nd St., Cleveland 3, Ohio

For more details circle 165 on Enclosed Return Postal Card.

Concrete Curing Mit

Fiberglas concrete curing blankets have been announced by Owens-Corning Fiberglas Corporation. The new product is a fine-fibered flexible, resilient, felt-like blanket of fibrous glass bonded with a thermo-setting resin, completely enclosed in a tough 8-mil black polyethylene film.



Fiberglas Concrete Curing Blanket

It is claimed the blanket allows relatively little water loss and temperature variations during the curing period. It is specially designed for repeated use after single service. It is available in two thicknesses: Standard 1-in. and the heavy duty 2-in., in a width of 72-in. and a length of 50-ft.

Owens-Corning Fiberglas Corporation, Toledo 1, Ohio.

For more details circle 166 on Enclosed Return Postal Card.

New 4½-Yard Scraper

A new light hydraulic scraper, the "Soil Mover 450", with a capacity of 4½ cu. yd. has been announced by The Farmhand Company. It can be handled by larger wheel-type or by



The "Soil Mover 450"

crawler tractors. It features hydraulic front ejection, double-action hydraulic cylinders for accurate control of depth of cut, and a cutting blade positioned rearward for even fill with less power. Load can be dumped in motion or standing still.

The Farmhand Company, 121 South Washington, Hopkins, Minn.

For more details circle 167 on Enclosed Return Postal Card.

Rut Patching Material

A new, all-weather outdoor patching material for chuck-holes, cracks and ruts in black-top, concrete, brick, stone, even cinders, has been developed by The Monroe Co., Inc. It is stated that ZOR-X can be applied in the winter months, quickly and economically, even if the surface is wet for the temperature as low as 15°F. It sets imme-

dately. There are 2 grades—one for depressions less than 2-in. deep—one for holes more than 2-in. deep. The depression or crack has only to be filled with ZOR-X, then tamped.

The Monroe Co., Inc., 10707 Quebec Ave., Cleveland 6, Ohio.

For more details circle 168 on Enclosed Return Postal Card.

Vibratory Screeds

The line of Thor "StraPaction" vibratory concrete finishing screeds has been expanded to include 16 to 30-ft. lengths, with Thor screeds now available in standard lengths from 4 to 30 ft. in 1-ft. multiples. The extra-long screeds also include these new design



Thor Finishing Screed

developments: two tension cables on each beam, assuring that the screed will remain in plane with no fatigue, sagging, or crowning; 8-hp engine; new aluminum end housing for ready access in adjusting straps or cables; new strike-off angle plate on leading edge, T-plate on trailing edge, for added beam reinforcement and larger finishing surface; 2 x 6 beams for increased strength, rigidity over longer lengths.

Thor Power Tool Co., 175 N. State St., Aurora, Ill.

For more details circle 169 on Enclosed Return Postal Card.

3-5 Ton Tandem Roller

Galion's 3-5 ton variable weight tandem roller has been completely redesigned and is now equipped with "Roll-O-Matic" drive, which is claimed to greatly increase its performance and ease of handling.

The new roller has all the features, appearance and design of the larger size Galion tandem rollers, including the same type of sturdy frame and guide roll yoke and hydraulic steering mechanism. A variable speed steering adjustment is provided within easy reach of the operator. Other features mentioned in the specifications include extra-large diameter ballastable rolls, dual operating controls, spur gear final drive enclosed in oil-tight housing, and a water-cooled gasoline engine delivering 32 hp at 2400 rpm.

The Galion Iron Works & Mfg. Co., Galion, O.

For more details circle 170 on Enclosed Return Postal Card.

Manufacturer's Literature

PILLOW BLOCK AND FLANGE BEARINGS are described in Bulletin No. 106 of Hoover Ball and Bearing Company, 5400 South State Road, Ann Arbor, Michigan. Photographs, dimension drawings, and complete tables are given.

For more details circle 171 on Enclosed Return Postal Card.

CONSTRUCTION EQUIPMENT: Illustrated Pocket Catalog WCG-1P from Watson-Cmetco, 1316 67th St., Emeryville 8, Calif., lists 21 different items of concrete and asphalt placement equipment—available from one source—for use by contractors and local government maintenance departments.

For more details circle 172 on Enclosed Return Postal Card.

ALUMINUM'S ROLE IN THE GROWING FENCE MARKET is reviewed comprehensively in a booklet entitled, "Chain

Link Fencing of Alcoa Aluminum," just released by Aluminum Company of America, 769 Alcoa Bldg., Pittsburgh 19, Pa. The booklet outlines details of actual highway, industrial, and municipal installations. Technical data on strength and other properties are included.

For more details circle 173 on Enclosed Return Postal Card.

ATLAS COPCO INCORPORATED, 610 Industrial Ave., Paramus, N.J., has issued folder No. E-434, giving complete step-by-step instructions for rethreading Sandvik Coromant extension rods.

Diagrams provide full machining dimensions for both Sandvik's $\frac{7}{8}$ and 1-inch hexagon cold rolled rods and for the 1- $\frac{1}{4}$, 1- $\frac{1}{2}$ and 2-inch round rods.

For more details circle 174 on Enclosed Return Postal Card.

THE FULL RANGE OF AVAILABILITIES OF KAISER ALUMINUM traffic control signs are reviewed in a recently published booklet with product and installation illustrations and complete specifications. Beside presenting the advantages of aluminum, the booklet discusses the various reflective sheeting metal treatments, fabrication methods, basic metal preparations, painting methods, and preparation of baked enamel and porcelain enameled signs.

"Aluminum Traffic Control Sign" can be obtained from Kaiser Aluminum & Chemical Sales, Inc., Department NR-18, 919 North Michigan Ave., Chicago 11, Ill.

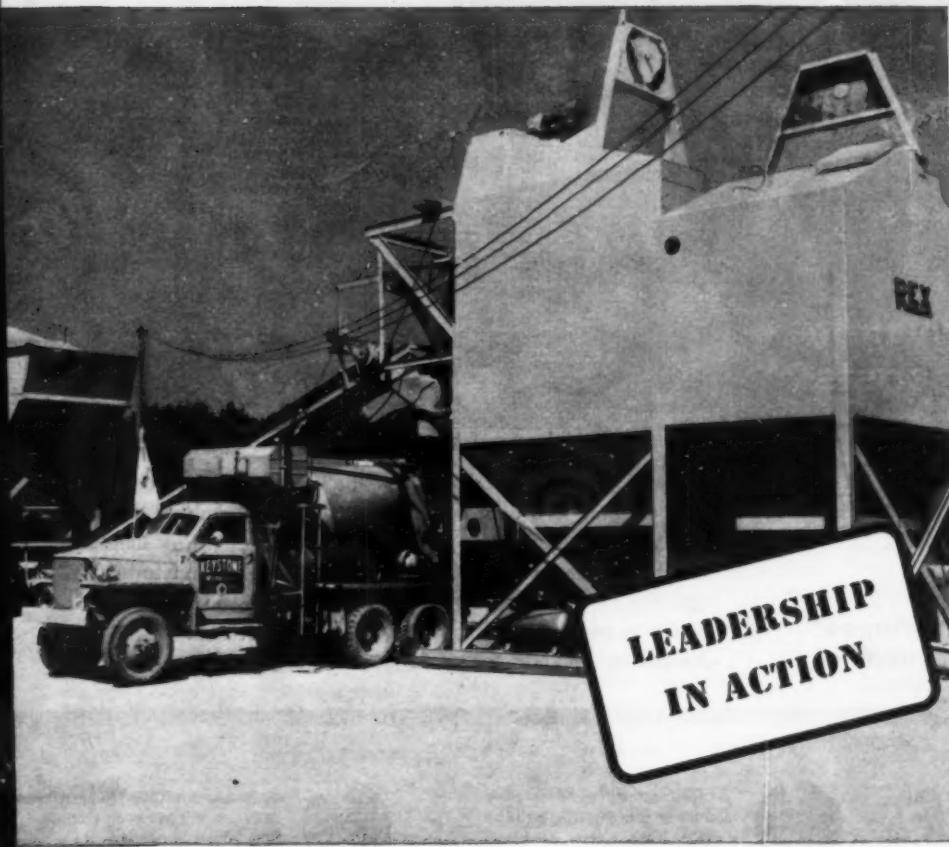
For more details circle 175 on Enclosed Return Postal Card.

THE AMERICAN CONCRETE CORP., 5092 North Kimberly Ave., Chicago 30, Ill. has issued a 28-page catalog No. 400 devoted to "Hy-Lite" stress-spurs standards for street and highway lighting. The complete line is shown, including several new designs.

For more details circle 176 on Enclosed Return Postal Card.

(Continued on page 159)

CONTRACTOR PUTS REX® PORTO-PLANT ON MAJOR AIRPORT JOB...AND GETS:



1

25% FASTER
PAVING

2

PERFECT QUALITY
CONTROL

3

JOB-BIDDING
ADVANTAGES

Keystone Construction Company, Meadville, Pennsylvania, made a wise move on this half-million-dollar airport paving job. It added its own mobile batcher—a Rex Model 60 Porto-Plant—and got an immediate nearby source of concrete, batched to exacting specifications.

"We were able to pave 25% faster with the help of the Rex Porto-Plant set up at the airport construction site," reports Franklin Miller, vice president. "Not only do we do our paving faster than formerly, but we have better control of quality. What's more, we'll continue to profit from our Rex Porto-Plant by using it on jobs over a 100-mile radius from Meadville.

"We poured approximately 60 cu. yd. every hour by teaming up our Rex Porto-Plant with four mixers and a Rex Concrete Finisher—a rate it would be difficult to duplicate with remotely purchased ready-mix," concludes Mr. Miller.

Size up all the advantages of having your own Porto-Plant—in lower bid figuring, in faster paving service, in highest quality concrete. See your Rex distributor or write CHAIN Belt Company, 4652 West Greenfield Avenue, Milwaukee 1, Wisconsin.

In Canada: CHAIN Belt (Canada) Ltd., 1181 Sheppard Ave. East, Toronto, Ontario.

REX®
CONSTRUCTION MACHINERY

NEW CATALOG of Rex Model 60 and 125 Porto-Plants just released. Ask your Rex distributor or write us.

... for more details circle 301 on enclosed return postal card

10 minutes for complete pump overhaul...

why put up with expensive down time and high repair costs?

on the spot maintenance with



"High Performance" Pumps* keeps your jobs on schedule

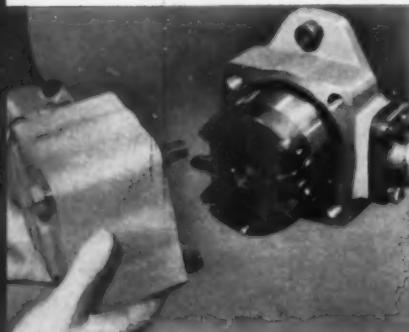
*PATS. & PATS. PENDING



Without removing the pump from the vehicle, and without disconnecting hydraulic lines, the new Vickers "High Performance" pump can be completely overhauled by simply inserting a new pumping cartridge. The pumping cartridge contains all wearing parts in one replaceable unit and results in new pump performance. Write for Bulletin No. M5108 for performance characteristics.



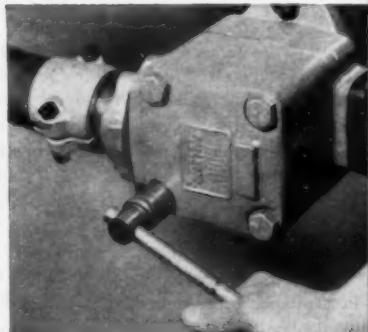
1. After safety, cleanliness and draining instructions have been followed per vehicle manufacturer's recommendations, take out four cover bolts and remove cover.



2. Take out old pump cartridge and insert new one. The cartridge includes cam ring, rotor, vanes, etc. —all parts in one assembly.



3. Replace cover and you have the equivalent of a new pump ready for long, trouble-free service.



212

VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION

Mobile Hydraulics Division
ADMINISTRATIVE and ENGINEERING CENTER
Department 1432 • Detroit 32, Michigan

Application Engineering Offices: • ATLANTA • CHICAGO • CINCINNATI
CLEVELAND • DETROIT • GRAND RAPIDS • HOUSTON • LOS ANGELES
AREA (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Springfield, N.J.)
PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon)
PORTLAND, ORE. • ROCHESTER • SAN FRANCISCO AREA (Berkley)
SEATTLE • ST. LOUIS • TULSA

ALSO SOLD AND SERVICED IN AUSTRALIA, ENGLAND, GERMANY & JAPAN
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto, Montreal & Vancouver

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

... for more details circle 357 on enclosed return postal card

Manufacturers' Literature

(Continued from page 156)

DIAMOND LINE RIDER FORMULATIONS chemically designed to simplify, speed-up, and economize on weed and brush control work along turnpikes, expressways, highways and secondary roads are concisely reviewed in a new combination folder—wall chart just issued by Diamond Alkali Company, 300 Union Commerce Bldg., Cleveland 14, O.

For more details circle 177 on Enclosed Return Postal Card.

THE DORR SR CLARIFIER for rapid sewage sludge removal, which is basically the familiar S-8 clarifier with improvements, is described in Bulletin No. 6193 just issued by Dorr-Oliver Corporation, Stamford, Connecticut, U.S.A. The bulletin includes installation photographs, line drawings of the unit, and a chart of design data.

For more details circle 178 on Enclosed Return Postal Card.

A CUSTOM-BUILT MOUNTING HITCH FOR fastening its P-160 Base Paver Attachment to individual tractors is highlighted in Bulletin No. 2635 just issued by Blaw-Knox Company, 300 Sixth Ave., Pittsburgh 22, Pa. Other features of the attachment include an exclusive oscillating screed, simple depth, width and crown adjustments, and an easy-loading hopper that permits spreading stone, slag, gravel, soil or pugmill mix aggregates over 400 tons per hour.

For more details circle 179 on Enclosed Return Postal Card.

CATERPILLAR TRACTOR COMPANIES special 24-page Monthly Time and Costs Record Book, just issued, contains 12 sets of pages on which to record, day by day, each month's individual machine expenses for an entire year. An annual summary sheet is provided at the end.

Spaces are provided for both quantity and cost of diesel fuel, gasoline, lubrication oil, grease, filters, hydraulic oil, repair labor, and operator's time. Additionally, there is space for the type and amount of miscellaneous costs—transportation, tires, tire repair, etc. A "repairs column" allows ample room for recording repairs and costs. A "machine hours worked" column allows the owner to record actual hours operated. The "type of work" column provides space to classify the work done so that cost for different types of work can be compared.

In order to record expenses as they occur in the field, a pocket size Daily Time And Cost Record booklet is also available.

Copies of the "Monthly Time And Cost Record Book", Form 33215, and "Daily Time And Cost Record Booklet", Form 32818-G, can be obtained at no cost from Caterpillar dealers or by writing to the Advertising Division of Caterpillar Tractor Co., Peoria, Ill.

For more details circle 180 on Enclosed Return Postal Card.

KENSINGTON STEEL, DIVISION OF POOR & CO., 505 Kensington Ave., Chicago 28, Ill. has released Bulletin 1061 describing in full detail the many features of its grouser plates. These plates are cast of "Supermang," one of several specially alloyed manganese steels developed by Kensington Steel. These plates are stated to have an initial hardness far in excess of regular manganese steel and the added ability of developing an even greater degree of surface hardness in the areas where continued wear and abrasion cause the most trouble.

For more details circle 181 on Enclosed Return Postal Card.

"**SPECIAL EQUIPMENT FOR ALLIS-CHALMERS CRAWLER TRACTORS** and for Allis-Chalmers Motor Graders" is a new 12-page catalog (MS-1189) now available from the Construction Machinery Division, Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis. Pictured and explained are attachments and accessories available to increase capability, versatility, and operator comfort and safety.

For more details circle 182 on Enclosed Return Postal Card.

2-WAY COMMUNICATIONS PARTS: Motorola 1959 edition of its Communications Buyers Guide (1-59) is available from Motorola Communications and Electronics, Inc., Parts Department, 4910 W. Flournoy St., Chicago 44, Ill. The Guide has been considerably enlarged from previous issues to make it a complete catalog of two-way communications parts, kits, chassis, test equipment and accessories. New sections have been added, covering not only normal replacements, but also many kits and accessories designed to provide more efficiency in communications systems. Among the 1959 Guide's features are new and improved test equipment, printed circuit repair kits and information and components needed for split channel conversion.

For more details circle 183 on Enclosed Return Postal Card.

A HISTORY OF ENGINE-POWERED MACHINERY through the past 40 years is given in the current issue of "Production Road", quarterly magazine of Twin Disc Clutch Co., Racine, Wis.

For more details circle 184 on Enclosed Return Postal Card.

DAVEY COMPRESSOR CO., Kent, O. has announced a new bulletin (Form E-273) on its "Auto-Air" truck mounted compressors. Contents include photos, specifications and installation diagrams. 5 "Auto-Air" models are listed. 2 of these are rotary type compressors, delivering 125 and 160 cfm. 3 piston type machines—75, 125 and 160 cfm capacities—are shown.

For more details circle 185 on Enclosed Return Postal Card.

UNIT CRANE & SHOVEL CORP., 6411 West Burnham St., Milwaukee 19, Wis. has issued a 12-page bulletin showing its New Model 360-T truck crane and containing specifications for the 30, 35 and 40 ton models. The bulletin describes in detail 14 feature points of "Why Unit is a Superior Machine" plus other technical data.

For more details circle 186 on Enclosed Return Postal Card.

A RUST INDEX OF THE UNITED STATES, listing the different rates at which metal rusts for each of 523 U. S. cities, has been published by the Rust-Oleum Corp., 2799 Oakton St., Evanston, Ill. Rates vary from three to 15 years.

For more details circle 187 on Enclosed Return Postal Card.

MOTOR GRADERS AND ROAD ROLLERS: Huber-Warco Co., Marion, O. has published a new folder (Booklet HWG) on its complete line of motor graders, road rollers, and the M-52 maintainer that performs nine different jobs.

For more details circle 188 on Enclosed Return Postal Card.

Right-of-Way Effort Reorganized in Michigan

Acquisition of real estate in connection with highway work in Michigan has proceeded at nearly 300 parcels per month, with the load growing.

With this in mind and the anticipation of 450 parcels to be acquired in 1959, the Michigan State Highway Department has revamped the organization for efficient handling of this part of the work. A section within the department's right-of-way division is set up for each of the following specializations: mapping and engineering, appraisal, acquisition, title and closing, condemnation referee, property management, field engineering and project status.

The Wayne County road commission is designated as the agent for acquiring land under heavy schedules for metropolitan expressways. Management of Detroit area and other work will include a program of decentralization, with a program of putting policies and procedures into writing, stepping up trainee recruitment, and improving in-service training.

TRAFFIC SAFETY

Michigan Halves Highway Accident Rate

A three-year campaign by the Michigan State Safety Council and supporting state departments including the highway, has resulted in cutting the highway traffic fatality rate of the state roads from 7.1 per million vehicle-miles to 3.9. This campaign is estimated to have saved about 1,000 lives in the period.

Emergency Standby Service For Highway Accidents

The New Jersey Turnpike authority has developed a "unique standby" system for providing emergency equipment for accidents. It has been termed one of the most practical and effective systems on the nation's highways.

Authority chairman Joseph Morecraft, Jr., credited the system as a basic factor in keeping the turnpike's fatality rate among the lowest in the nation. He said that the records disclose no instances where lives could have been saved by speedier emergency service.

Currently, 36 first aid squads and 22 fire departments are included in the Authority's standby system. These units divide the 131-mile superhighway into overlapping areas of responsibility of about 8 miles each. For this service, the Authority makes a substantial contribution every six months to each participating unit. In addition, each first aid squad receives \$25 for each call and the fire department \$50 for each piece of apparatus sent out.

An ambulance arrives on the scene of an accident at any location generally at not more than 15 minutes from the "call time," according to actual records. There is a standby first-aid squad within three minutes from all points of entry to the turnpike. Where interchanges are far apart, the Authority has provided emergency entrance gates connecting with local roads.

The first-aid squads on the turnpike have an average membership of 24 men, with some exceeding 50 members. Within minutes these squads can have two ambulances on the road and specially equipped crash trucks with portable generator and lights. Several squads have attending physicians supplementing highly trained personnel.

Also the Authority has engaged an equivalent nucleus of units auxiliary to the standby squads. These serve in the event the regular units are on another call, or when additional units are required.

Barriers for Entire New Jersey Turnpike

Fifty capital improvement projects costing more than \$6 million are proposed for the New Jersey Turnpike system for 1959. General manager W. W. Wanamaker lists 22 items as top priority at about \$2,700,000.

Most costly as well as urgent project contemplated is the construction of median barriers. A million dollars a year may be appropriated for them during the next three years. When complete in 1961, the barriers, designed to prevent head-on collisions, would extend the entire length of the highway.

Directing Signs Planned for Chicago Expressways

Special signs are contemplated along expressways in the Chicago area, designed to direct motorists to large shopping centers and other locations of major interest.

The new type of signing is proposed by William J. Mortimer, Cook County Highway Superintendent, who has presented the proposal to state and federal highways officials. At present only traffic signs of certain accepted standard legends are permitted along expressways.

The proposal was made following evidence that many motorists using the new expressways, such as Edens in the Chicago suburban area, have failed to turn off at points of exit which would lead them to their desired destination.

CIVIL ENGINEERING HANDBOOK. (4th Edition.) Editor-in-Chief Leonard C. Urquhart, of Porter, Urquhart, McCreary & O'Brien. 1174 pages, 6 x 9, 814 illustrations. McGraw-Hill Book Information Service, 327 W. 41st Street, New York 36, New York. Price \$17.50.

This new edition of a well known handbook presents a large body of essential theory, standards, practice and data for solving specific problems in civil engineering. Modern advances in all segments of the practice are covered in the revision, which represents the work of numerous authorities and specialists.

Court Decisions For Contractors

The Union Contract

A recent decision reported by the U. S. Court of Appeals for the Fifth Circuit, in *Woodward Iron Co. vs. Ware* 11/19/58, upholds the employee's right to sue his employer to enforce personal rights which are derived from the union contract.

In this case, as reported by the Virginia Road Builders Association, the court held that it was not necessary to exhaust the grievance procedures of the union contract before bringing the suit. The court held that the discharged employee was the third-party beneficiary to the union contract. As such he has certain common-law rights of action for damages for breach of contract. Nor does he lose his right of action if he elects to use the courts instead of the arbitration channels.

In the instant case the employer believed and the union agreed that the employees had been discharged for just cause. Despite this agreement, it will be noted that the union was not made a party to the agreement. This case will serve to illustrate the extreme involvements into which an employer can get when he signed a union contract.

Defective highway

Contract was made by the Louisiana Highway Department with a contractor for patching, widening and resurfacing seventeen miles of highway. In this highway six miles beyond the location of the contractor's actual work there had been for many years a broken place in the pavement.

Suit was brought against the contractor in which it was claimed that this hole in the pavement had been the cause of a head-on collision between two cars. In sustaining a judgment in favor of the contractor the Federal appellate court said,

"This highway defect was in no way caused or brought about by the contractor. Nothing that the contractor was doing affected this defect or produced from it a peril to the traveling public any different from that which it would have presented a day or a week before the contract commenced or had it by chance been located outside of the boundary limits of the project."

McClelland v. T. L. James & Co., 231 Fed. 2d 802, Louisiana.



EXPRESS PAVER resurfacing 15 miles of U. S. Highway 70 south of Huntington, Tennessee. Warren Brothers also used Blaw-Knox Wideners on their portion of the \$1,200,000 project. Express Paver is laying upwards of 1,000 tons per day in a 1½ inch layer. Job Superintendent Bragg is shown at left and General Superintendent Duckworth at right.

We're 50% ahead of schedule because of the speed of this Blaw-Knox Express Paver"

"Despite the difficulty of this particular mix, our Blaw-Knox unit is laying up to 142½ tons per hour. Although we've had weeks of bad weather, we're 50% ahead of schedule on the maximum 250-day contract time," says R. F. Bragg, Job Superintendent on the Warren Brothers project.

"The quality of roadway is superior to that laid by crawler-mounted equipment. And the Blaw-Knox longer wheelbase reduces waves in the pavement that are sometimes felt when driving over asphalt roads laid by shorter wheelbase

pavers. Rubber tires make it possible for us to work faster in completing the major moves that the machine makes, and it paves up to 20% more in the same amount of time," adds Ray Duckworth, General Superintendent.

Here is another instance of proved advantages—faster, better quality paving with freedom of movement—that contractors everywhere are experiencing with the new Blaw-Knox Express Paver. See your nearest Blaw-Knox Distributor for a technical report on this project, or write direct. There's no obligation, of course.

... for more details circle 290 on enclosed return postal card



BLAW-KNOX COMPANY

Construction Equipment

300 Sixth Avenue
Pittsburgh 22, Pennsylvania



takes
a big bite!



Swings
and Dumps FAST



Operator can
SEE what he's
doing at all times!

• Here is one of many contractors who prefer the UNIT 513C Challenger for handling bulk material. The pictures show the machine removing and loading used carbide slack from the pit of a large chemical plant. Equipped with $\frac{1}{2}$ yard clamshell bucket, the 513C takes a big bite, swings and dumps fast. Output averages about 30 yards per hour. Hydraulic clutches, and easy-to-reach levers, simplify the machine operation. And the safety-promoting FULL VISION CAB enables the operator to SEE what he is doing at all times. Get all the facts. Write for Bulletin.

A8-5025

UNIT CRANE & SHOVEL CORP

6407 W. Burnham St., Milwaukee 19, Wis., U.S.A.

... for more details circle 356 on enclosed return postal card

Bituminous ROADS AND STREETS

Hot-Mix Producer Uses

Two Sizes of Plants

This Fort Wayne operator tailors his production to the customer by using 2,000 and 4,000-lb. plants . . . simultaneously, when needed.

Dailey Asphalt Products Co., Inc., of Fort Wayne, Indiana, has its own method of economizing in asphalt plant operation: it adapts its production to the job by using two plants of different capacities.

The Dailey firm, the oldest asphalt producer in continuous operation in the Fort Wayne area, had a gross output of approximately 60,000 tons in 1957. The company does its own paving for customers such as the city of Fort Wayne, Allen County, construction

firms in the area, and occasionally the state of Indiana. Its operating area in northeastern Indiana lies within a 50-mile radius of Fort Wayne.

Until a year ago, Dailey had used a plant of 2,000-lb. capacity. It was decided at that time that a larger plant was needed to provide quicker production, and the company purchased a Standard Steel Corporation Model R-M 4,000-lb. capacity plant. But instead of selling or discarding the old plant, the de-

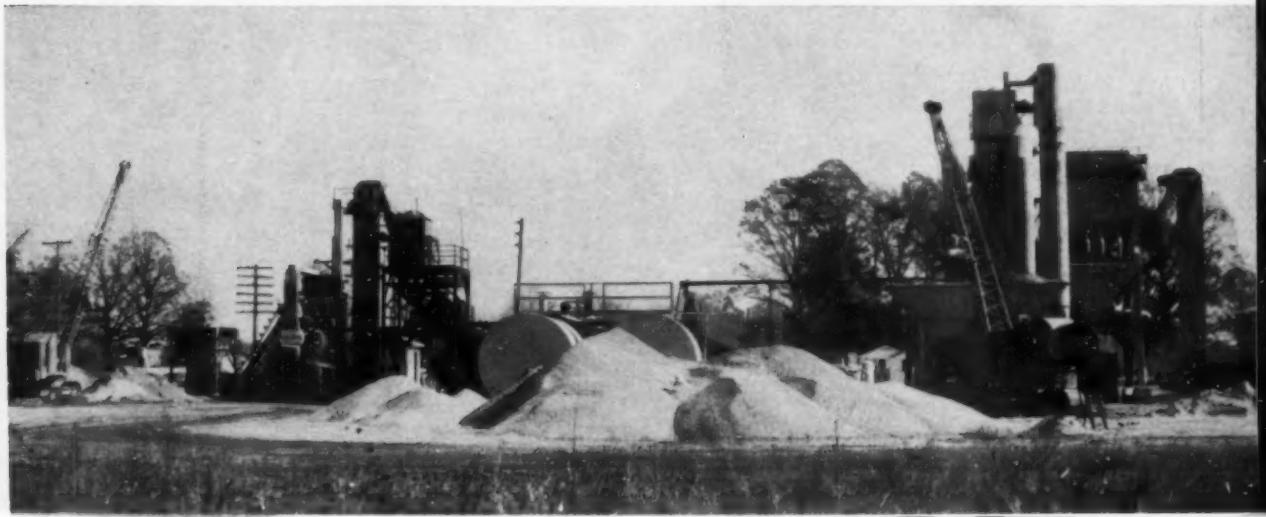
cision was made to keep it in service. The reasoning was as follows:

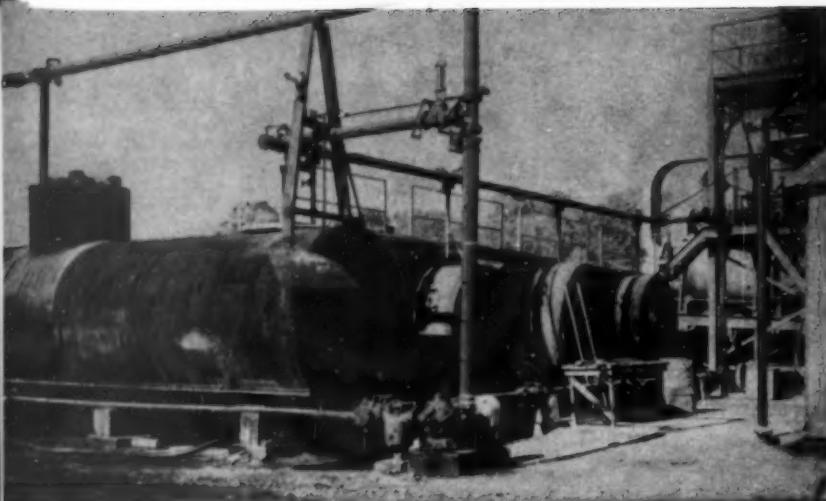
On county and city road jobs of 5,000 and 6,000 tons and up, and on larger parking areas, the higher production rate of the big plant was needed to keep pavers supplied. But on jobs of 2,000 and 3,000 sq. yd. and less, where but one paver works perhaps intermittently, the smaller plant could handle the necessary daily mix output. This also would permit the larger plant to take on another job simultaneously.

Also, while the Standard plant shuts down about November 1, the smaller plant can be used as late as the weather permits on smaller, clean-up jobs.

At peak capacity, the larger plant produces about 140 tons per hour, the other about 50 tons. Average daily production for the two is about 1,600 tons. Roughly 80 percent of the output is normally used on the owner's paving jobs. Though Dailey Asphalt Products is wholly owned by a sister firm, L. W. Dailey Construction Co., it however operates independently, handles its own business and bids

- Rear view of the Dailey plant. From left: Insley $\frac{1}{2}$ -yd. crane; the smaller plant; aggregate piles with two 12,000-gal. road oil tanks behind them; the larger Standard plant with its $\frac{3}{4}$ -yd. crane.





• The larger tank is part of 34,000-gal. road oil storage facilities for Dailey's extensive black top maintenance work. Other three tanks hold 60-70 grade penetration asphalt.



• At left, an Inaley $\frac{1}{4}$ -yd. clamshell charges the 25-ton bin of the Standard plant. All bin gates and weigh hoppers are activated electrically by the operator at his control panel.



• The Standard Steel Corporation plant of Dailey Asphalt Products Co., Inc., at Fort Wayne, Indiana. In operation is the company's 4,000 lb. plant, with older 2,000 lb. plant just out of sight at right.

its own jobs. The company employs about 30 men.

The present plant site was established eight years ago on a 25-acre plot seven miles from downtown Fort Wayne. A feature of the location was its relatively isolated nature, with the nearest house about one-half mile away. Two front entrances lead into the plant yard from the road. Next to one of these entrances is a smaller gate which leads directly onto a Thurman portable scale, used when required for state road jobs.

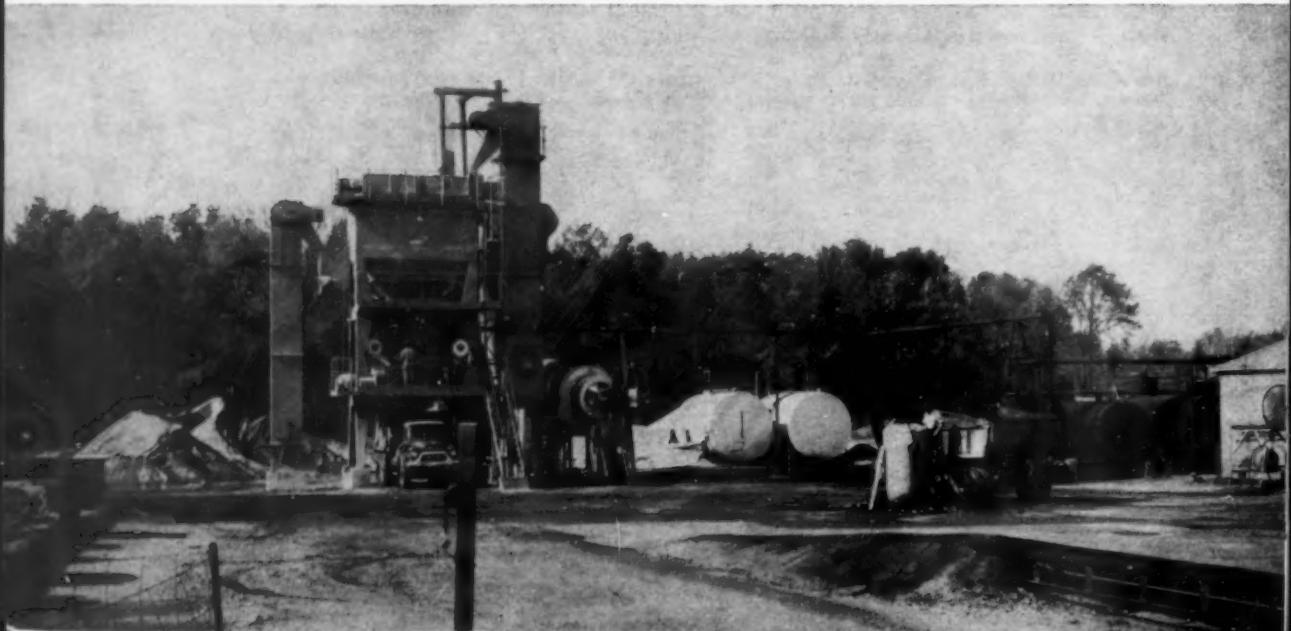
At one side of the yard is a 100 ft. long maintenance shop for the paving equipment. Toward the rear are two 12,000-gal. tanks containing Gulf road oil. The smaller plant, with its own aggregate piles, is located at one side of the yard.

The operation of the main plant is as follows:

Stockpiles. Besides sand and three sizes of gravel, Dailey also maintains a supply of aglime which is used, in 50-50 proportion to sand, for the surface mix on Fort Wayne's streets.

Raw Materials Flow. A $\frac{3}{4}$ -yd. Insley clamshell charges a 4-compartment Standard bin of 25-ton capacity. A reciprocating feeder, driven by its own electric gearmotor, feeds the material through screw-type, adjustable cut-off gates to the cold elevator. These 8" x 16" buckets, operated off a 10 hp motor, take the material to the dryer.

Dryer. This is a 6' x 28' single drum unit driven by a 40 hp motor.
(Continued on page 166)



Wants dependable source for Asphalt *--buys from STANDARD OIL*



Sarrington Construction keeps on schedule, gets other benefits from using STANDARD Asphalt

When you put down 8.3 miles of Asphalt in nine working days, your materials have to be there when they're needed. Sarrington Construction had at least two good things working for them when they contracted to pave a section of Wisconsin State Highway 49, southeast of Ripon. They had (1) a dependable source of supply for Asphalt and (2) on-the-spot assistance from an experienced Asphalt man. They had contracted for STANDARD Asphalt.

Deliveries of 85-100 grade STANDARD Asphalt came to Sarrington's continuous mix plant on schedule from Standard's Whiting Refinery 195 miles away. This is one of four strategically located Standard Oil refineries Sar-

rington could draw upon for deliveries. From Milwaukee came Frank Cocking, an experienced Asphalt salesman with 25 years' service with Standard.

Delivery on schedule, well located Asphalt supply sources, technical service by experienced men, attention to contracts when Asphalt is in short supply as well as when it is plentiful. This is what Sarrington Construction gets by buying from Standard Oil. You can get this sort of service, too. Call the Standard Oil office near you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Ave., Chicago 80, Illinois.**

... for more details circle 349 on enclosed return postal card

You expect more from



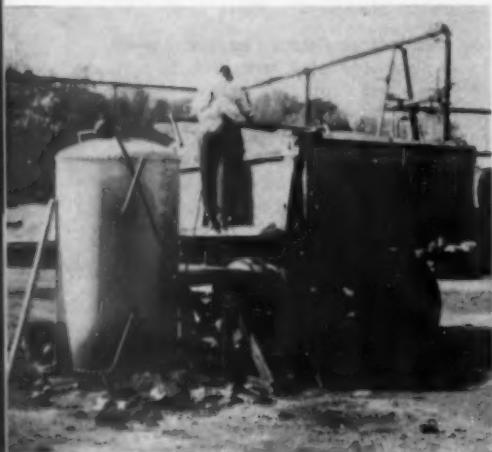
and you get it!

Having someone who knows Asphalt construction on hand when you're putting down the road can be a help. Frank Cocking discusses how job is going with David Gasser, Sarrington Construction owner-partner. Here contractor is laying three inch pavement— $\frac{1}{2}$ inch binder, $\frac{1}{4}$ inch wearing surface—on 22 ft. width. David Gasser directs firm's highway paving work. Partner John Scott supervises rest of Sarrington's operations throughout Wisconsin, applying STANDARD Asphalt in Sealcoat work.





• A Chicago Pneumatic compressor is used with the hot oil heater.

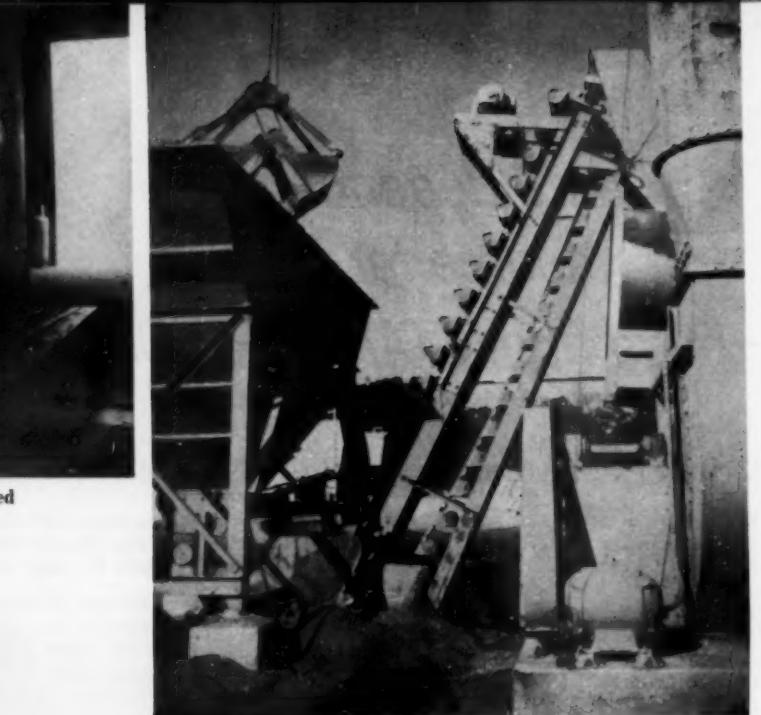


• Water tank for truck body spraying is located in center of the yard for easy access.

The General Combustion model 30-R burner employs natural gas.

For cleaning purposes, dry material is introduced into the dryer after the day's last job, is circulated for 10 to 15 minutes and then run through the plant.

Hot Materials. The hot elevator is driven by an electric gearmotor with roller chain and cut tooth sprocket drive. The material is



• A reciprocating feeder delivers material from the bin compartments to the cold elevator.

carried up to a Symons 48" x 12" screen which drops sand and $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ in. gravel into the four compartments of a 40-ton capacity storage bin.

The Detecto scales at the aggregate weigh hopper are 4-point suspension, dustproof, springless dial type. The hopper discharges through an air cylinder operated gate.

Asphalt. The company's 60-70 grade penetration asphalt is stored in three insulated tanks, former railroad tank cars, one of 6,000 and two of 8,000-gal. capacity. (A fourth 10,000-gal. tank in this line contains road oil.)

The 300-deg. storage heat of the asphalt and 150-deg. heat of the road oil are maintained by a Childers D-100 hot oil heater which has a heating capacity of 48,000 gal. This heater, measuring 12'5" x 48 $\frac{1}{2}$ ", generates 2,100,000 BTU's per hour, has a heater circulating oil capacity of 300 gal., pump capacity of 150 gpm.

The asphalt is sent by a Blackmer pump through 3-in. overhead pipes directly to the hopper where it is weighed by a Detecto scale. No pump is needed for discharge of the asphalt into the mixer, as the spreader bar, of extra large diameter, is designed for adjustable gravity discharge across the length of the mixer at the mixer's centerline.

Mixing. The 4,000-lb. capacity

mixer, a twin pugmill type, is driven by a 75 hp gearmotor connected to timing gears through a heavy duty roller chain and cut tooth sprocket drive. Material is typically dry-batched 15 seconds and wet-batched 45, depending on the customer's specifications.

Controls. The Standard plant is operated by a Simplex batch control system. Electrically controlled air cylinders operate bin gates, asphalt and aggregate weigh hoppers and mixer gate. Instantaneous cutoffs are provided by push buttons at the control cabinet.

Mineral Dust. An enclosed belt and bucket conveyor driven by a 3 hp motor lifts dust into a bin where a screw-type conveyor carries it to the aggregate weigh hopper. The motor which operates the screw conveyor is also controlled by push button from the operator's platform.

Dust Control. The dust collector is a 10-ft. cyclone type unit. A washer system was considered unnecessary by Dailey because of the isolated location of the plant.

Supplies and Delivery. All materials are brought in by truck. Aggregate is supplied by May Sand and Gravel Corporation (seven miles away). Asphalt has been furnished by three firms: Standard Oil Co., Seneca Petroleum Co., and Laketon Asphalt Refinery. Deliveries are scheduled in proportion to

(Continued on page 179)

DAILEY'S EQUIPMENT

- 1 Case 320 front-end loader
- 1 Essick 2-ton tandem roller
- 6 Austin-Western 2 to 12-ton rollers
- 1 Buckeye spreader
- 1 Foote bituminous paver
- 2 Adams bituminous pavers
- 1 Austin-Western 88 grader
- 1 Austin-Western 99 grader
- 1 Insley $\frac{3}{4}$ -yd. shovel
- 1 Insley $\frac{1}{2}$ -yd. shovel
- 1 Etnyre bituminous distributor on International R-180 truck
- 1 Jaeger Air-plus portable compressor
- 6 aggregate trucks, Ford, Chevrolet, International

Views and Comments

By H. G. Nevitt

SOIL STABILIZATION ESSENTIALS

WE HAVE in previous years commented on the possibilities in soil stabilization and the comparatively slow progress being made in utilizing them. Unfortunately we see no change in this situation, at least in this country; in many others, faced with stringent economic pressures, at least more effort is being made to gain the great savings inherent in the use of modified local soils. We believe that the slow progress is primarily due to either a lack of exact knowledge of the requirements or lack of assurance in the results. If this is correct, amplified discussion and exploration of the factors which are holding back progress should be helpful.

As we see it, soil stabilization programs are mainly nullified by the lack of a complete engineering attack, primarily due to the limited attention given to some necessary phases. The literature on the subject is of course voluminous; but analysis indicates that it is primarily confined to two aspects of soil stabilization. The first is the exploration of the theoretical phases of the modification effects, and their extent as indicated by laboratory studies. The other is the description, mainly from a strictly construction viewpoint, of actual soil stabilization projects. The considerable area in between these extremes—primarily the development of a logical and reliable design for a specific soil, utilizing potentially suitable modifiers—has not received too much attention. If this is the correct situation, some brief mention of the fundamental steps required for a successful soil stabilization program should be helpful and we will attempt this. Essentially it sums up to a series of questions which must be answered in a clear-cut as well as sound fashion to assure results. We will state the individual questions and briefly discuss them.

1. *Will the additives under consideration actually function as expected?*

Despite the theoretical background in the use of additives the actual response of each soil must be investigated by suitable techniques. While the extensive laboratory work in this field should be sufficient to provide the background for such a program, it actually involves some of the most difficult decisions in the design procedure. The studies must be complete, they must give the practical answers, but at the same time they must not be so burdensome as to discourage the approach. Furthermore, in some situations laboratory experiments should be supplemented by some field studies before a really complete program of soil stabilization is decided upon.

2. *Will these effects be permanent?*

This is a point on which much work in the laboratory as well as the field is still required in our opinion. There is a sufficient accumulation of theoretical and practical knowledge to show that some of the effects from additives are reversible or merely temporary, but this factor is not always given sufficient consideration in deciding the soil modification approach. Furthermore, the ultimate effects of the modifying agent rather than the immediate must receive attention. Often the questions: "How will this base probably fail if such occurs, and how long will it take to reach this failure condition?" are pertinent; probably the answers to them, even if only guessed at, often would be a decisive factor in determining the program to be followed. Many soil stabilization procedures which give excellent results for some two to five years may eventually prove to be very unsatisfactory because the final effect of the modifying agent does not suit the requirements of a flexible design, or the effect will be lost and in due course the soil will revert to the untreated condition.

3. *How do the modifying agents function?*

If this is not fairly well under-

stood neither the preceding question nor some of those following can be safely answered. Too often modifying agents, while effective in certain situations and apparently equally suited to others, do not in the end prove satisfactory because consideration was not given to the way they work. This is another difficult phase of a soil stabilization program for many engineers but the answers to it are obtainable.

4. *What type of base will result?*

This question is of course to some extent a corollary of the preceding one but the general answer to question No. 3 must be translated into a specific visualization of the structural result from the use of the modifying agent. For example, a modifying agent which eventually provides a rigid base over a soil which will inevitably produce movement will in due course fail unless of proper design to satisfactorily function as such, and this of course must be determined by the designer so that the needed type of structure will be selected.

5. *What properties are needed for the base to function properly?*

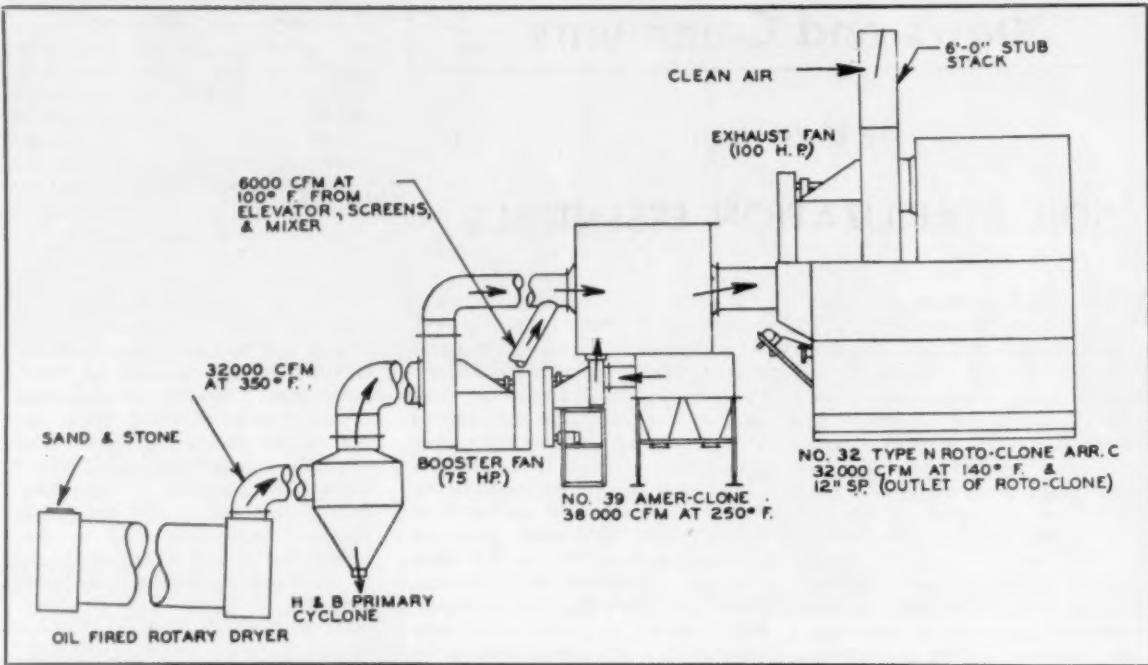
This is again to some extent a corollary of question 3, but it brings in other aspects. Often modifying agents can be combined to give the type of base which will do the job. This, of course, requires both knowledge of how they work and the results which are needed, so that the combination can be properly determined.

6. *What thickness of base and top do these properties call for in order to meet the design requirements?*

In the usual road building agency there is a design technique for determining the proper thicknesses of the structural layers. In many cases, however, the standard approach is either not applied to the stabilized layer or is based on assumptions which no longer maintain for the modified soil. We have encountered many examples of a good soil stabilization procedure which failed simply because the proper design thicknesses were not established on the basis of the properties of the component layers and the way the structure would act under load.

7. *What construction procedures are implied by the program, and are they feasible from the available equipment and financing standpoints?*

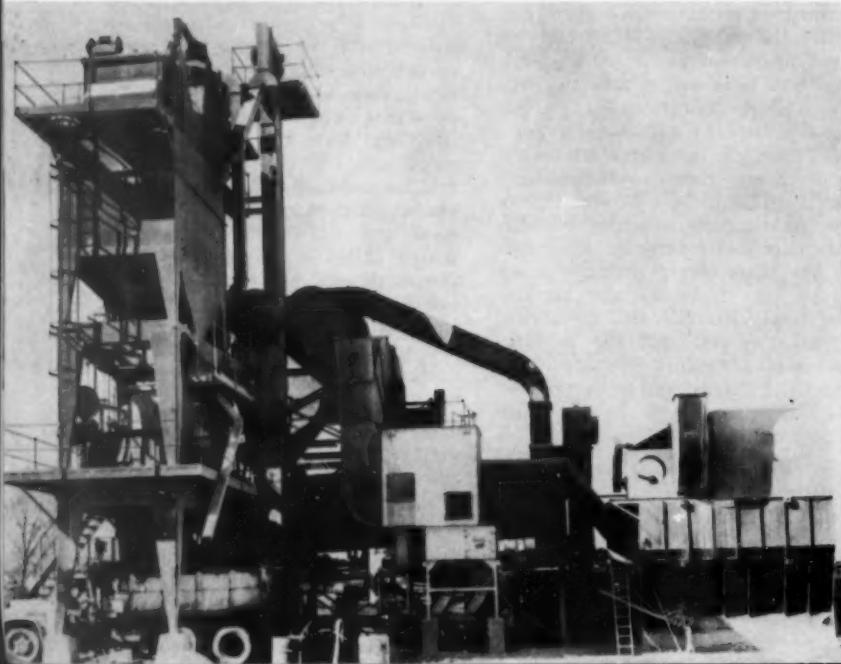
(Continued on page 179)



- Dust control system and other elements of new asphalt plant at Bituminous Products Company.

Dry Dust Collector Saves Buying Fines

- Bituminous Products Company's plant as equipped with the dust collector equipment here described.



By William Tarbell

Vice President,
Bituminous Products Company,
Buffalo, New York

TESTS WERE run late in 1956 on an asphalt plant at Bituminous Products Company, Buffalo 25, New York. The purpose was to determine a method for reclaiming dry fines issuing from the company's single-shell type dryer. It was hoped that sludge handling problems could be reduced and use of water held to a minimum (water supply was limited). The dust control system was to be improved if conditions so warranted. The study was made in anticipation of a new asphalt plant, then proposed.

The test conditions were as follows: an exhaust system carried dust laden air from the rotary dryer, first through an American Air Filter skimmer and then through an AAF wet scrubber as the final stage. With production at 500 tons per day, dust loading from the dryer was approximately 30 grains per cubic foot. An air volume of 18,000 cfm was maintained in the exhaust system. Dust concentration leaving the skimmer was about 10 grains per cubic foot.

- The wet scrubber was a high-

efficiency Type N Roto-Clone with automatic sludge ejecting equipment. Dust loading into it was thought to be rather high. Required efficiency of 95 percent was maintained by the collector but disposal of large amounts of slurry discharge was a nuisance. The daily weight of *dust only* in the slurry was approximately 6 tons.

Bituminous Products Company also noted that while it was discarding these fines as wet sludge, it yet had to supply dust for filler, for some of its mixes, by purchasing from outside sources.

Accordingly, the main purpose of the tests was to determine how fines then discarded could most effectively be reclaimed.

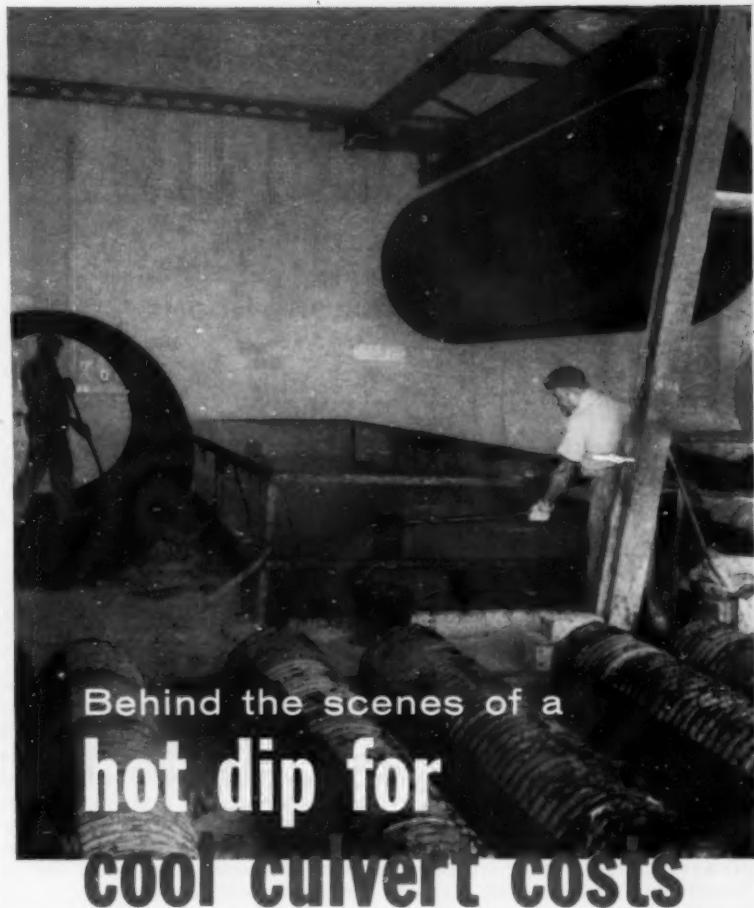
Initial studies of the test plant were made during which 300 cfm was tapped from the main exhaust line just following the skimmer. Dust loading at this point was determined to be 10 grains per cubic foot, as expected. Next was inserted a high-efficiency, dry centrifugal Amerclone collector in the line, this unit being designed especially for such applications. In the test it maintained its efficiency rating of 90-95 percent and thus reduced dust loading into the scrubber to 0.5-1.0 grains per cubic foot.

- Arrangements were then made to install a larger size Amerclone in the dust control system of the Hetherington & Berner plant. This unit, installed in September of 1957, handles 38,000 cfm at a dust flow rate up to 50 lb. per min., or about 24,000 lb. per 8-hour day. When fines are needed Bituminous Products Company now draws part of the required amount from the unit's hopper. In one particular mix, the company uses 160 lb. of salvaged fines per ton of mix.

The dust control system at the new plant is shown in the accompanying sketch. Repeated tests of the new collector show that fines collected are of the types desired for many mixes. Some 90 percent or better of the fines pass a 200 mesh screen. While requirements on filler dust vary, the owners feel it unlikely that fines thus produced will fail to meet specifications where fines are needed.

Taking advantage of this dust control windfall has meant considerable savings to Bituminous Products Company at their new plant, as much as 12 tons of fines per day can be reclaimed at an average price of \$4 to \$5 per ton, or a pos-

(Continued on page 177)



Behind the scenes of a hot dip for cool culvert costs

Production got a push, costs took a dive when the Carolina Culvert and Metal Co.—division of Florida Steel—installed Cleaver-Brooks Peak Temp a year ago.

The operation: dipping sections of culvert in hot asphalt. Peak Temp's job: keep a 7000 gal. dip tank of asphalt and a 7800 gal. storage tank at 400°F. Peak Temp has been doing it on a 14-hr. day schedule with no shutdown since installation. Owner reports Peak Temp installation costs were only 1/2 of previous heater. And gas heat bills run only \$225.00 per month.

Peak Temp forced-circulation oil heater does away with high-pressure steam lines, valves, boilers. Raises and maintains bitumens and heavy viscous materials to application temperatures much faster than steam.

- **FORCED CIRCULATION** provides uniform heat distribution. No carbon build-up.
- **COMPLETELY AUTOMATIC** — fully equipped with advanced operating and safety controls. Quiet, smokeless. Completely fiber-glass insulated and metal-jacketed.

Cleaver Brooks®
ORIGINATOR AND LARGEST PRODUCER
OF PACKAGED BOILERS

- **OPERATES AT ATMOSPHERIC PRESSURE** — minimum attention and maintenance.
- **NO REFRactory** in furnace to replace or maintain. No stack.
- **CIRCULATING OIL LASTS INDEFINITELY** — won't freeze in spring and fall operations.
- **HEATS OIL TO 450° F.** without special pumps and fittings.
- **RUGGED**, all-welded construction.

Versatile — easily adapted to heating a variety of viscous materials such as plastics, residuals. Highly effective, too, for quick drying of forms used with cast, prestressed concrete and structural members.

For full information write Cleaver-Brooks Company, Dept. B, 395 E. Keefe Ave., Milwaukee 12, Wis.



... for more details circle 295 on enclosed return postal card

CROWN AND PROFILE CONTROL

to Improve Riding Quality of Old Bituminous Roads

Outlining the steps taken in the Kansas program of asphaltic resurfacing to better correct the crown and grade of the existing road. The procedure described applies to all commercial finishing machines.

By Frank M. Drake
General Inspector, Kansas Highway Commission, Topeka

A TRUE and uniform crown and grade line can be restored to old roadway surfaces by making a preliminary profile survey and by attaching a crown control device to the bituminous paver.

The crown control used on the bituminous paver in Kansas is simply a carpenter's level or equivalent placed on a cross-member located over the hopper or near the front of the paver. The cross-member is attached to the front ends of two arms protruding from the rear of the paver, along each side of the paver and directly over the floating screed arms. The two protruding arms are attached in a two-point fulcrum manner at the rear, one point of attachment being to the screed arm directly over the leading edge of the screed and the other being just behind the adjusting

screw to a member further attached to the rear edge of the screed.

In other words an arm on each side of the paver is attached solidly to the screed, so that the front end of each arm will raise or lower as its respective adjusting screw increases or decreases the bituminous mat thickness. The front end of each arm will raise or lower, as the crawler track on the respective side rises over a hump or lowers while traveling through a depression.

• *These are the principles* by which the crown control is operated. For the use of crown control alone it must be assumed that the larger part of irregularities are on the outer portion of the roadway surface and that the middle portion of the roadway is relatively true to center line grade.

- Leveling device in use on a Kansas resurfacing project, as described in the accompanying article.



By these principles the crawler traveling nearest the center line of the road travels along a reasonably even grade line and the adjusting screw on this side should be changed only with caution. The crawler that travels nearest the outer edge of the roadway travels over irregular areas, and rises over humps and lowers through depressions. The crawler and arm nearest the center line will travel to a relatively even grade line. As the paver moves forward this arm remains at a relatively constant elevation in respect to the grade line.

The constant crown is obtained by a full time operator, who watches the carpenter's level and adjusts the mat thickness on the outer edge to the extent that the carpenter's level will stay in a level position.

As the outer crawler rises over a hump or lowers into a depression, the outer arm also will rise or lower and will be so indicated by the carpenter's level. When a rise is indicated the operator decreases the mat thickness and as adjustment is made the outer arm lowers and when a level position is regained on the carpenter's level the adjustment is stopped until further or new condition is indicated by the carpenter's level. The reverse procedure is made when the outer crawler lowers into a depression.

• *Operator Skepticism.* Since the use of the floating screed was developed the manufacturers have advised against over-control, and operators have been skeptical at the procedure and have said that the constant adjustment will constantly keep the screed warped. This is not true and study shows that the screed will be warped if allowed to follow the path of the crawler over a rise or down with a depression. The adjustment under this procedure is made in the opposite direction of the effect of the irregularities and compensates for their effect leaving the screed in a true plane.

This has been applied to pavers with adjusting screws on the rear of the paver, however, the pavers with adjusting screws up front on the pivot point are more easily fitted by attaching the carpenter's level directly to the pivot points making false arms unnecessary.

This procedure requires a full-time operator on the outer adjusting screw and requires the carpenter's level to be held in a level position at all times. The continued level position is important if a constant crown is to be the result. In return for this extra operator the

leveling operation ahead of the paver is reduced and in most cases eliminated. The control device is in use on Kansas projects on Blaw-Knox, Cedarapids and Barber-Greene pavers. The attachments and mounting locations vary between makes; however the theory is the same for all makes and the results are equally as good for all makes.

The crown control corrects only crown or transverse irregularities and has no effect on longitudinal humps or sags. Because of the excellent results of the crown control, the profile or grade line irregularities are more apparent and are accentuated by the constant and uniform crown.

• The solution to this problem is in the profile control. This consists of taking elevations at 25-ft. intervals along the path of the inner crawler or along a line approximately 2 or 3 ft. on each side of the center line at the roadway surface. The points are plotted to a distorted scale to form a profile that will magnify the irregularities and can be read directly to hundredths of a foot vertically. 1 in. = 25 ft. horizontal and 1 in. = 0.5 ft. vertical has been proven to be the most convenient scale.

With straight edges and flexible curves a new grade line is laid above the existing profile keeping in mind the desired minimum and maximum thickness. The required thickness at each 25-ft. interval can then be read back from between the existing grade line and the adjusted grade line. These thicknesses are then recorded in a book to be given directly to the paver operator, or to be marked on the pavement at their respective points.

Experience has shown that the elevations should be taken every 25 ft. on the profile to show the exact ends of the variations; however, the largest deviations only should be placed in the paver adjustment.

Finally these variations are given to the paver operator to adjust into the center line side of the paver. These adjustments should be made gradually as the pivot point of the floating screed passes between the two adjacent points involved. While these adjustments are being made, the operator on the outer side with the aid of the carpenter's level keeps the outer side at a constant elevation in respect to crown with the center line side. These two operations performed simultaneously.

(Continued on page 174)



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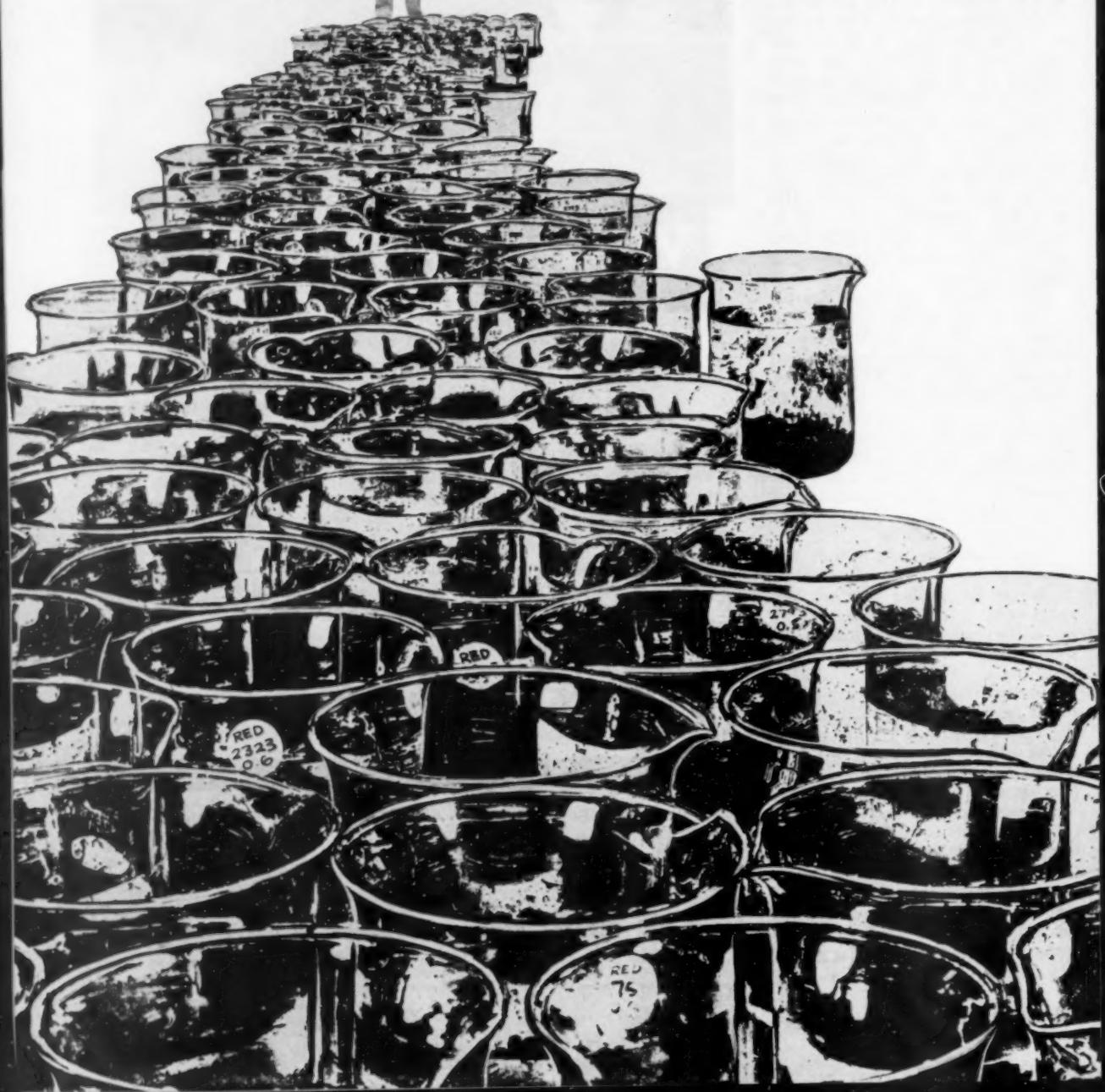
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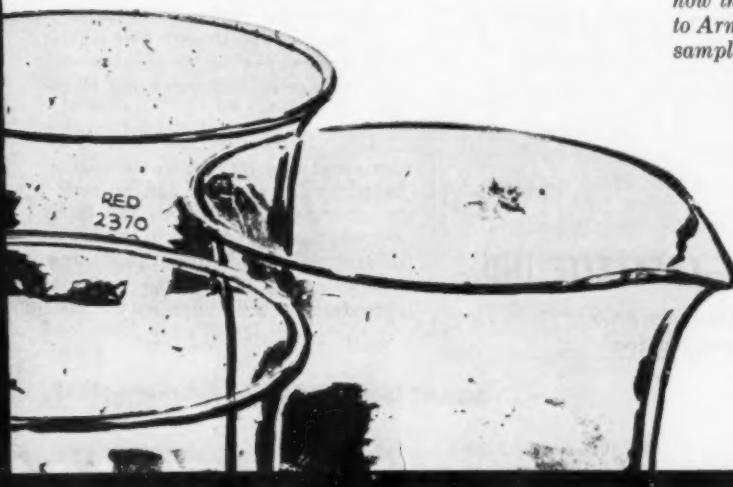
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(Continued from page 171)

ly constitute the profile and crown control. The center-line side of the screed is forced to follow a predetermined theoretical grade line while the outer side of the screed is forced to follow a constant distance (crown) below.

● **Good Results.** In theory these two procedures should produce perfect surfaces. However, they do not, yet their results are gratifying. The conclusions are that better riding and better shaped surfaces can be obtained with less effort on the part of the contractor. It is hoped that through work such as this that the manufacturers may be induced to develop pavers with more positive thickness control. This writer believes that crown control is now ready for automation; however, it will be difficult to develop a machine capable of distinguishing between a vertical curve and a low sagging center line.

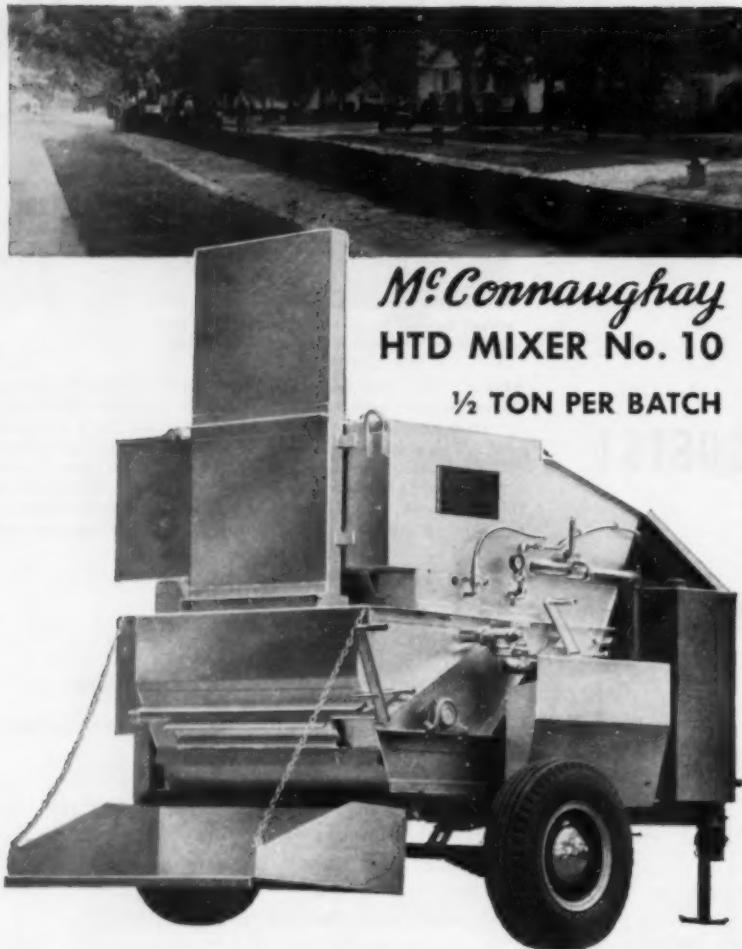
Contractors have expressed favorable opinions for this procedure because the blade leveling is either reduced or entirely eliminated. Operating costs are reduced and the actual paving area is more confined. This saving more than offsets the additional cost of the extra operator on the paver.

The engineering task created thus cannot be considered. A crew of four men can easily obtain four miles of profile in a normal day and can make their survey during the off construction season when the work is slack. The electronic computer can be programmed with a series of averages or a straight line approach to calculate the varying thicknesses. Estimated quantities can be included in the program.

To obtain the best results in compaction the corrections should be made in the binder course so that the pneumatic tired roller can be fully utilized in rolling the uneven thicknesses. The uneven thicknesses in the binder course will cause a difference in roll-down. The difference however is not as great as the variation caused by spot blade leveling.

This description has been general, and is intended to show that better riding surfaces can be made by giving a little aid to the bituminous paver. An inch in thickness of material taken from a high area and placed in a low area makes a considerable difference in the rid-

(Continued on page 177)



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174

Notes on German Practice in Natural Aggregate Bituminous Concrete

By W. T. Zoepf

Civil Engineer, Trier, Mosel, West Germany

THESE NOTES are in response to an informative letter from S. B. Hudson, enclosing Technical Paper No. 57 on "Practical Gradation Limits for N.A.B.C." (natural aggregate bituminous concrete).*

Your painstaking investigation of the gradation problem as evidenced in T.P. No. 57 is of great interest to us. Although the conclusions drawn in the paper will be exactly true only for the specific aggregates analyzed, general observations fully substantiate our own experience with NABC in Europe. As a preliminary criterion of the gradation of pit-run gravel or mixtures thereof we here utilize the Aggregate Grading Chart after Rothfuchs. Instead of drawing sieve sizes in a log-scale, these are shown in a square-root-scale. Any straight line drawn from the origin through the diagram, is in effect a "maximum density curve" (Fuller curve). Natural well-graded aggregates very seldom approach this theoretical voidless status but generally show a "hump" above the "minimum void line" with aggregate voidage between 15 and 25 percent.

Nevertheless the Rothfuchs Chart is considered here a valuable tool for preliminary suitability investigations of local materials for NABC gradations: the flatter the gradation curve and the more it approaches the "minimum void line," the higher is the Marshall stability as long as sufficient air voids remain in the mixture.

As you will gather from Enclosure No. 1, NABC-Base Course Mixtures have been tentatively divided

in three types in accordance with the aggregate used:

- Type A: Sand Mix (Fine)
- Type B: Sandy Gravel Mix (Intermediate)
- Type C: Gravel Mix (Coarse)

Enclosure No. 1 shows the gradation limits and recommended A.C. penetration grades for the three types. After the construction of approximately 3.5 million sq. yd. of NABC-base courses (most of them 5 to 7 in. thick) within the last three years in West Germany on roads and streets of all classifications, a survey showed that the specifications as set forth in Enclosure No. 2 are practical and will be used for future guidance as design and control criterion.

A typical cross-section of a heavy-duty bituminous pavement as presently constructed on various new Autobahn (4-lane) sites is shown in Enclosure No. 3. You will gather therefrom that the total thickness of the bituminous pavement is almost 12 in., all hot plant-mix, 7 in. thereof is NABC base. The foregoing gives a short survey of the latest developments in NABC bases in West Germany.

Now to your questions on problems of reflection cracking of bituminous overlays on p.c.c. pavements. The practice of a bond-prevention sand layer between the concrete base and the asphalt pavement has been only shortly used and is now abandoned in Germany due to unsatisfactory performance and inability to prevent reflection cracks.

The problem of reflection cracking is battled nowadays in different ways, evidenced by the following examples:

1. Old, badly cracked p.c.c. pavement on Autobahn, constructed about 1937/39, 9 in. thick, partly reinforced with point-welded steel mesh, on nonpumping but traffic-consolidated sandy subbase.

The post-construction densification of the subbase by high-speed and heavy traffic resulted in void spaces underneath the pavement slabs and caused failure of the slabs due to lack of firm support.

For resurfacing, this old p.c.c. pavement is demolished into slab pieces about 12 to 20 in. square by heavy explosion rams and/or 3-ton steel balls dropped from mobile

Editor's Note—The following was addressed by letter to S. B. Hudson, Chief Engineer, Miller-Warden Associates, Swarthmore, Pennsylvania. The author who is a leading authority in German highway work is a member of the Association of Asphalt Paving Technologists, Highway Research Board, and American Road Builders Association, in addition to technical bodies in his own country.

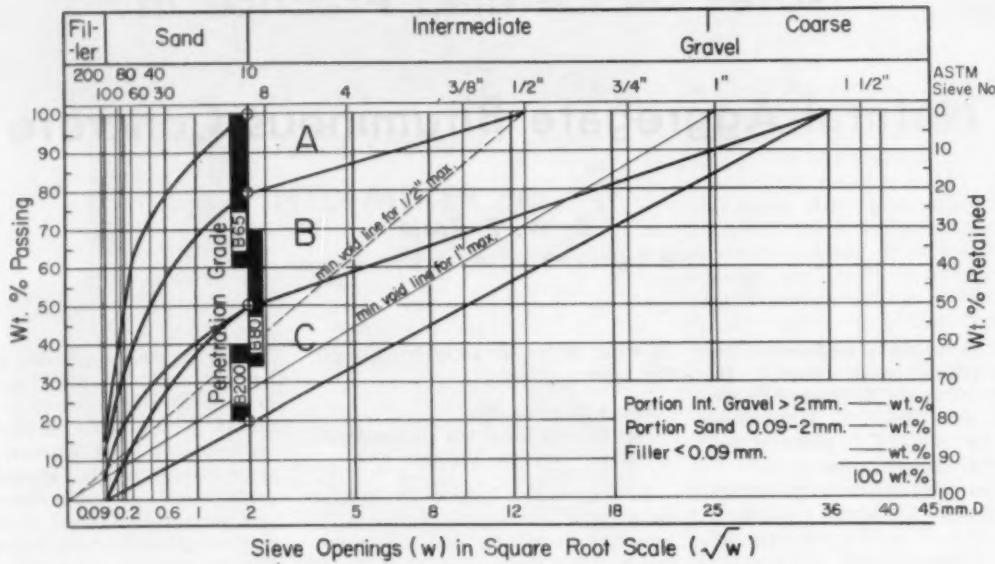
Readers may wish to compare these notes to the article on German practice in asphalt concrete base design and construction by Paul Fluss, published in Roads and Streets September, 1958.

* Paper given at the National Bituminous Concrete Association's annual meeting, Las Vegas, February 3, 1958; reproduced in ROADS AND STREETS, May and June, 1958. The requests for reprints of this paper have been world-wide.—Editor.

SIEVE ANALYSIS

(after Rothfuchs)

Hubert Zettelmeyer
Constructing Engineer



A. Sand Mix (Fine)

B. Sandy Gravel Mix (Intermediate)

C. Gravel Mix (Coarse)

Incl. No. I.

● Figure 1—Gradation limits for three types of base mixtures.

cranes. This demolition not only causes the slabs to break off into individual pieces, forming a sort of "flexible base," but also forces these pieces down to the subbase which

now again fully supports the base.

Settlement caused by this demolition is of the order of 1½ to 2 in. and commensurate with the "void spaces" under the old pavement.

The surface of the demolished p.c.c. pavement then receives a tack coat and heavy asphalt resurfacing, consisting of:

(Continued on page 178)

Design Specifications for NABC—Base Courses (Proposed)

TRAFFIC DATA: Classification:	"Light" also: Cycle Tracks	"Medium"	"Heavy" also: Parking Lots, Urban Streets with Parking	"Extra Heavy"
Vehicles per 24 hours: Percent Heavy Vehicles	less than 1000 less than 5 percent	1000-3000 5-10 per cent	3000-6000 10-20 percent	over 6000 over 20 percent
TOTAL THICKNESS NABC-Base Course (appr.)	7-10 cm 2 1/4-4 inches	10-15 cm 4-6 inches	12-18 cm 4 3/4-7 inches	15-20 cm 6-8 inches
MARSHALL TEST DATA:				
140° F. Stability (min.)	150 kg	200 kg	250 kg	300 kg
2x50 blows	330 lbs	440 lbs	550 lbs	660 lbs
Flow Value (min.-max.)	10-50 .1 mm 4-19.7 .01 in	10-45 .1 mm 4-17.7 .01 in	10-40 .1 mm 4-15.7 .01 in	10-35 .1 mm 4-13.8 .01 in
Per cent Voids Total Mix	min. 2 max. 15	2 15	3 12	3 10

*) Present traffic data on Autobahn:
up to 60,000 VPD, thereof 25 to 30 percent
heavy vehicles (over 4 tons)

SOIL STABILIZATION

(Continued from page 167)

Contractors are flexible and not averse to taking on new equipment and methods if the proposed program will assure a payout for this pioneering. Yet these matters must be carefully considered, as well as the suitability of the climate or probable construction weather to the field operations implied in the program. Where and when must be the concern of the program planner as well as how.

The above questions and the discussion of them are more or less elementary and perhaps obvious. Yet we can safely maintain that there are numerous examples of soil stabilization programs in which they have not been answered or the answers have not given the full or true picture. Furthermore, many engineers seem to shy away from soil stabilization projects because they subconsciously feel that they do not have the answers to these questions and therefore they are uncertain as to the results they can look forward to. It is fortunately true that there is probably sufficient knowledge of the field available to get extremely satisfactory results or safely exclude approaches which do not assure these; and likewise it is true that those competent in this field should attempt to develop information along the lines indicated and spread the knowledge of the possibilities of soil stabilization and how to obtain them more widely. Certainly the highway engineer cannot meet his requirement of providing the most roads for the money available unless he considers the possibilities of soil stabilization at every opportunity.

DRY DUST COLLECTOR

(Continued from page 169)

sible saving of up to \$60 per day. If the fines are all used or sold the saving amounts to more than \$15,000 per year.

Meanwhile the installation has maintained the original dust collection efficiency for air pollution control, while reducing maintenance and handling of discharge slurry by more than 80 percent, cutting water use, and eliminating outside purchase of dry fines.

Technical assistance in the tests and selection of equipment was accomplished by James S. Munson, supervising engineer of American Air Filter Company, and Phillip A. Loes of Weber-Loes-Weber, Ass. Inc., Buffalo, New York.

OVERLAY CONTROL

(Continued from page 174)

ing quality when cars are traveling at modern-day speeds. An article from the Missouri Highway Department in a previous issue of this publication indicates that other states are making similar changes in resurfacing techniques, and also feel justified in giving special attention to grade and crown control of bituminous paving construction.

- Interstate road construction contracts were awarded in December, 1958, for 274 miles of jobs, at \$167 million. Completed during the month were 364 miles including 251 bridges costing \$147 million.



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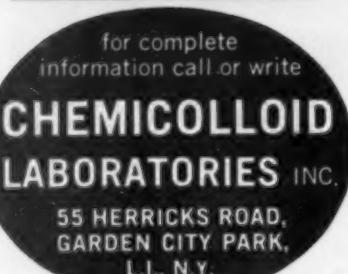
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(Continued from page 176)
6 in. NABC Base (in 3 lifts)
3 in. Binder Course (in 2 lifts)
1½ in. Wearing Course: "Guss-asphalt"-Mastic

2. New construction of heavy-duty highway, using a p.c.c. base course and bituminous pavement.

The base course is built of 8 in. lean concrete, dummy joints cut at 35 ft. centers.

No tack coat is applied to the concrete surface, but a bond-prevention coat of lime-water-slurry is

painted 2 ft. wide on both sides of the dummy joints. The bituminous pavement consists of two binder courses and asphaltic concrete wearing course, with 4 ft. wide expanded steel inbedded between the first and second binder course above any dummy joint. Thickness of bituminous pavement is 4 to 5 in. and has successfully prevented reflection cracking on various highways since 1954.

3. New construction as above, but utilizing the principle of the so-called "Felder-Beton" (short-slab

Typical Mixing Formulas for German Roads

Mastic ("Gussasphalt") Wearing Course

	% by wt. in mix
Crushed stone, ½ to 1½ in.	12.8
Crushed stone, No. 4 to ½ in.	18.3
Crushed stone, No. 10 to No. 4	9.2
Pit sand, No. 200 to No. 10	25.75
Mineral filler	25.75
A.C. 65 pen.	6.7
Trinidad Epuré	1.5
	100.0

Mixing temperature: 410 to 430 deg. F

Spreading temperature: 375 to 410 deg. F

Binder Course

	Lower % by wt. in mix	Upper % by wt. in mix
Crushed stone, ¾ to 1½ in.	47.5	—
Crushed stone, ½ to ¾ in.	—	29.0
Crushed stone, ½ to ¾ in.	14.0	—
Crushed stone, ½ to ¾ in.	—	22.5
Crushed stone, No. 10 to ¾ in.	10.0	19.3
Crushed sand, No. 200 to No. 4	23.75	23.5
A.C. 80/200 pen.	4.75	5.7
	100.0	100.0

NABC—Base Course

	% by wt. in mix
Sandy gravel*, pit-run (to bal.)	91.5
thereof: gravel, ½ to 1½ in.	(29.5)
gravel, No. 8 to ½ in.	(30.0)
sand, No. 200 to No. 8	(32.0)
Mineral filler	4.6
A.C. 80 pen.	3.9
	100.0

* Since 1958 a mixture of 70 percent gravel to 30 percent crushed stone is specified for base course mixes on Federal highways.

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ROADS AND STREETS, February, 1959

Thickness Inches	cm	Rate of Application (lb per cuyd)	Course
			Mastic ("Gussasphalt") Wearing Course
3.5	8.8	177	Upper Binder Course
4.5	11.4	200	Lower Binder Course
18.0	45.7	800	NABC - Base Course (in 3 lifts) Tack Coat between lifts: 3.3 lb per cuyd Emulsified Asphalt
15.0	38.1	-	Cement-stabilized Gravel Sub-Base 255 lbs of P.C. per cuyd spec. minimum compressive strength: 1140 psi after 28 days
30.0 to 40.0	76.2 to 101.6	-	Gravel Sub-Base compacted to 100 per cent AASHO T-99
Subgrade: USCS-Classifications: SH / ML GCR: 6 to 12			

• Typical cross-section for bituminous pavement, West German Autobahn (1957 and 1958).

p.c. concrete base).

This design is based on our knowledge that the extent of horizontal movement (i.e. expansion and contraction) at joints is directly commensurate to the slab length between joints: long slabs causing large movements at the joints and vice versa. The bending strength of bituminous overlays—to "bridge" horizontal movements of the underlying p.c.c. base without failure—is limited. It follows that the base slabs should be of short lengths, to cause only such small movements at their joints as not to overstress the overlay.

Short-slab concrete bases are constructed here by the following method: at a distance of 10 to 14 ft. prefabricated concrete "bars" of triangular cross-section (8 in. at base, 4½ in. high) are laid transversely on the compacted subbase; then the 8-in. thick concrete is spread and finished over the bars, which cause the concrete to form cracks over the bar ridges.

Horizontal movement at these closely spaced transversal cracks is so minute as not to cause reflection cracking within the bituminous overlays even of little thickness (say 2 in.).

The same effect of short-slab concrete bases could, of course, also be produced by cutting dummy joints at close intervals into an existing concrete pavement as preparation for a bituminous overlay.

I hope that this will about answer your questions on reflection cracking. Incidentally, the "black-and-white" pavement (bituminous pavement on concrete base) is con-

sidered by most of us as "mésalliance" for new construction and now almost belongs to the past, being replaced by NABC base courses with bituminous binder and wearing courses, as described above.

HOT MIX PRODUCER

(Continued from page 166)

the number and size of jobs at hand. Consumption of asphalt was approximately 4,200 tons in 1957, aggregate about 55,000 tons.

Dailey owns six trucks (International, Ford and Chevrolet) for transporting hot mix to the job. Three others are on regular lease for the hauling of aggregate, with additional trucks leased as business warrants.

Personnel. L. W. Dailey is president of Dailey Asphalt Products Co., Inc. Bill Everett is superintendent, with Tom Hague foreman of the asphalt plant.

• Boys will be boys, even out on earth-moving jobs. The "no passing" sign tacked on the back of this scraper—seen on U.S. 85 project of Metropolitan Paving Company, near Santa Fe—is only half humorous, however.

"No passing" was often a problem in the control of motor vehicular traffic through this job in the midst of scraper operations which paralleled the existing roadway.



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GENERAL SUPERINTENDENT required by leading construction company in Montreal, Canada. Must be experienced in maintenance and overhaul of heavy duty construction equipment and in the operation of welding and machine shop. Salary commensurate with ability. Give age, references, salary expected and full details of experience. Box 1211, Roads & Streets, 22 W. Maple St., Chicago 10, Ill.

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GENERAL SUPERINTENDENT required by progressive company in Montreal, Canada. Must be capable of supervising maintenance and repair of extensive motor fleet consisting mainly of heavy duty Mack trucks. Salary commensurate with ability. Give age, references, salary expected, and full details of experience. Box 1212, Roads & Streets, 22 W. Maple St., Chicago 10, Ill.

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- 3500 Manitowoc 2½ yd. Dragline.
- 38-B Bucyrus Erie 1½ yd. Comb. Shovel & Dragline.
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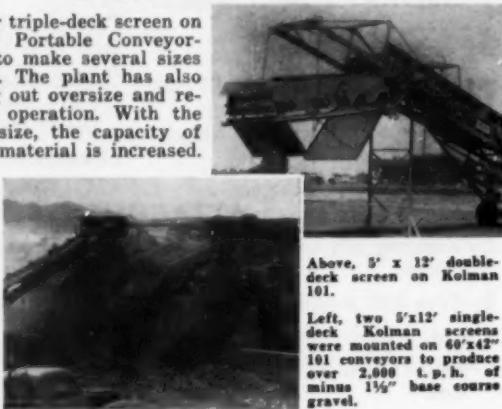
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Eleven Transit Mixers

Smith 5 Yd. Mixers (2) Continental power, sealed hopper, front water entry, unmounted.

Smith 5 Yd. Mixer Continental power, large water tank, rear water entry, sealed hopper, on Dodge tandem Truck.

Smith 5 Yd. Mixer, Ford V-8 power, open end, rear water entry, with Dynachute, mounted on Int. "LF190" Tandem Truck, 9,00 x 20 tires.

Rex 3½ Yd. Mixer, Chrysler power, 135 gal. mixing tank, front water entry, sealed door, new 1950. S.N. TD1850. Mounted on '53 IHC "LF174" tandem truck.

Rex 3½ Yd. Mixer, 2-comp. water tank, sealed hopper, rear water entry, Waukesha power, on Dodge tandem truck.

Jaeger 3½ Yd. Mixer, sealed hopper, rear water entry, Continental power, on Dodge tandem truck.

Jaeger 2 Yd. Mixer, unmounted. Buy it for parts. Make offer.

Jaeger 3 Yd. Mixer, S.N. J3752, Mounted on Chev. tandem axle truck.

Smith 3 Yd. Mixer, S.N. 56170, mounted on Chev. tandem truck.

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BS - 3 ton, Gallon 1956 tandem 3-5 tons.

Dryer - Madison 6 ft. x 28 ft. portable. Cummer 66" x 28 ft., BG #833. BG 5 ft. x 16 ft. BG #837.

Batch plants - Cedar Rapids 2500#, new 1952, A-1.

40 ton per hr. batch plant, \$10,500.

Bartee Grimes #840 with tower and dryer. Simplicity 9-60. In Central West - 4000# Standard, \$23,000.

Model E Cedar Rapids - 4000#, \$28,000 as is, where is.

Cedar Rapids Master continuous mix plant, 100 tons per hour.

Automatic electronic Cedar Rapids batching unit, for G60 plant, HB 50 ton feed bin. Pugmills, etc.

Hetherington & Berner most complete 1957 asphalt plant, 2500 lb. capacity.

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High Pressure Air Cylinder Diameter...12"

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2—BUCYRUS-ERIE B-105 Oil Burning Bit Furnaces with Blowers

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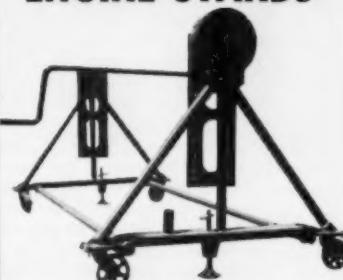
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Rubberized Asphalt Tested in South Dakota

The Bureau of Public Roads and the South Dakota highway commission are cooperating in the testing of a new rubberized asphalt seal coat known as RC-4DN; (that final "N" stands for Neoprene, a synthetic rubber compound developed by the duPont Company).

A pioneer in conducting rubberized seal coat experiments, the South Dakota highway commission has successfully treated more than 500 miles of its highways with RC-4D since 1954, according to the suppliers. (RC-4D is rubberized asphalt containing Styrene rubber.) Comparative tests now being conducted will check the advantages of RC-4DN (Neoprene) with those of RC-4D (Styrene), South Dakota specification RC-4, and RC-4 with natural rubber. Preliminary comparisons indicate excellent results for RC-4DN.

Contract for this test project was awarded to Summit Construction Company, Rapid City, S. D., and work carried out by Mel Hayden, superintendent. Wilbur Lovejoy, bituminous engineer; Robert Owens, district engineer at Aberdeen, and Donald Crampston, project engineer, supervised the project for the state of South Dakota.

The asphalt test section is near Groton on U.S. 12. Each material is used to seal coat a $2\frac{1}{2}$ -mile section. All asphalts were applied at 0.24 gal. per sq. yd. and covered with 30 lb. chips.

RC-4DN (with Neoprene) has been laboratory tested by duPont engineers since 1957 and more recently has undergone field testing, where it proved successful under the most extreme conditions. Laboratory tests of RC-4D rubberized asphalt (with Styrene) show $2\frac{1}{2}$ times the toughness of any top grade asphalt according to the suppliers. Laboratory tests show RC-4DN (with Neoprene) to have 6 times the toughness of its non-rubberized equivalent.

RC-4DN is manufactured by Husky Hi-Power, Inc., by blending duPont Neoprene into their formula. This firm, originator of this Neoprene seal coat, also manufactured the other test materials: South Dakota specification RC-4, RC-4D with Styrene, and RC-4

with natural rubber from the National Rubber Bureau of Washington, D. C. Western Oil & Fuel Company, Minneapolis, Minn., are the distributors.

Tennessee Grid Surveyed

A survey is now under way toward a long-range goal of tying all Tennessee highways into a "grid" system.

At the state's request, a team from the U. S. Coast and Geodetic Survey has started a project to determine and mark exact geographic positions within a narrow corridor between Jackson and Memphis.

State highway commissioner Herbert Bates said the survey will run a line across the state and mark it with monuments. The grid to be set up will run along true north-south and east-west lines. Under this system any part of a highway can be quickly located. All interstate highways being built in Tennessee will be on the grid system, and eventually all state highways will be included.

Analyzing the Job for Safety, Efficiency—and Money Saved

(From "Construction Safety Hints," prepared and distributed under auspices of Construction section, National Safety Council, Chicago 11, Illinois)

By R. J. Behley, Safety Engineer
Travelers Insurance Co.

Advance analysis of construction jobs is not new; in fact, some sort of analysis is made on every construction job. A contractor preparing a bid must make a reasonable, accurate analysis if he hopes to compete with other bidders and if he is to avoid a monetary loss. Those who have had practical experience in running construction jobs know you cannot get very far without a set of plans and specifications which clearly defines the

work to be done by the interested trades. Accident prevention, while not exactly a job trade, is a necessary function, yet many contractors start a job without determining the rightful place accident prevention holds financially and do little advance planning to eliminate or reduce job exposures.

Most contractors make up their bids under five major divisions: Material, Labor, Plant, Overhead and Profit. In the Overhead is buried an item designated as insurance. The amount placed in the bid is usually a percentage of the cost of material, labor and plant. The amount will vary with the type of job and is affected to some extent by the requirements of owners, architects, and the state in which the job is located. This insurance item includes the expense for the performance and payment bonds, workmen's compensation, social security, unemployment insurance, employer's liability, property damage, automobile insurance, fire insurance, builders' risk insurance, and other types of coverage which the contractor may select. Further, this insurance item is considered one of the fixed charges against the job. That is, like death and taxes, little can be done about it.

This reasoning that all insurance is a fixed charge is very misleading and indicates lack of understanding of one very important item—the Compensation Insurance cost.

Hi-TORQUE BRAKES. Aviation Products Division of the B. F. Goodrich Co., Akron, Ohio, has published a 4-page brochure describing the use of hi-torque brakes for heavy duty and off-highway construction vehicles. Brochure explains how the brakes increase the service life of heavy equipment, how the brake permits quick stopping, and how it gives equipment operators greater safety and control. Complete specifications are listed.

with the Manufacturers and Distributors

Caterpillar Men and Their Dealers Meet

The 8,640-acre Arizona Proving Grounds of Caterpillar Tractor Co. was the site of a 2-day conference recently by Caterpillar's sales and promotion top brass and personnel of its 128 domestic dealers.

Among the program leaders were W. K. Cox, Caterpillar vice president; William S. Zeigler, domestic sales manager; C. A. Barabe, sales manager, Caterpillar Americas Co.; Lee L. Morgan, sales promotion manager; John Jass, director of engineering and R. C. Brown, director of research. Main speaker at the banquet was president Harmon S. Eberhard.

E. J. Seifert, president, Pettibone Mulliken Corporation, Chicago, Ill., announces the election of F. R. Barth to vice president, finance, succeeding Wade Meloan, who resigned, and the appointment of A. R. Gasiorek as assistant to the president.

The promotion of K. R. Chandler from assistant sales manager to the



● Not a ball game but a crowd of Caterpillar men watching an equipment demonstration at the firm's Arizona proving grounds.

newly created post of assistant vice president of sales for Koehring Division of Koehring Company has been

disclosed by J. E. Chadwick, Sales Vice President and the appointment of William B. Dickerson as sales manager.

FREE Gulf Coast Pleasure Guide

THE Buena Vista

Overlooking The Gulf of Mexico at **BILOXI Miss.** Telephone: IDlewood 6-5511 Teletype 163

AAA
Master Motel
Beach Hotel and Motel

An advertisement for "The Buena Vista". It features a large graphic of a beach scene with a lighthouse and palm trees. Text includes "FREE Gulf Coast Pleasure Guide", "THE Buena Vista", "Overlooking The Gulf of Mexico at BILOXI Miss.", "Telephone: IDlewood 6-5511 Teletype 163", and logos for AAA and Master Motel. Below the main graphic is a smaller image of a building complex.

Write: **JIMMIE LOVE, Gen. Mgr., for your**
Free **GULF COAST PLEASURE GUIDE**

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COLLECTING EQUIPMENT — WELDING FUME COLLECTORS

A8-9403-1/9A

... for more details circle 344 on enclosed return postal card

EUTECTIC WELDING ALLOYS CORPORATION has opened a new warehouse service center to serve Boston and the greater New England area. Under the name Eutectic Welding Alloys-New England Division, Inc., the new center will be operated by D. Ryan, a veteran of long experience in the metal-joining field.

STUART W. GOODENOUGH has been named manager of Chicago district sales for the American Steel and Wire Division of U. S. Steel, as announced by B. M. Ashbaucher, newly appointed

western area manager of sales. At the same time, Robert H. Hauger was named to succeed Goodenough as manager of manufacturers products in the Chicago district sales office and David P. Philips was promoted to assistant manager of the manufacturers products department, the position being vacated by Hauger.

DON C. LIVINGSTON has been named manager, Two-Way Radio Sales, of a 10-state southern area by Motorola Communications & Electronics, Inc., a sales and service subsidiary of Motorola, Inc. Livingston had been regional manager in Kansas-Missouri and southern Illinois. He is succeeded in this position by William H. Hawks, formerly a zone manager in Kansas City, Mo.

KENNETH B. FORTNEY is the new assistant manager of International Harvester Company's Tractor Works in Chicago. Since 1953, Fortney has been general superintendent of Tractor Works. He succeeds Homer F. Griffith, newly-named manager of the plant.

ROBERT J. WARREN has been appointed field engineer for the Construction machinery division of Clark Equipment Company, according to an announcement by A. E. York, sales manager. Warren will render sales assistance service in the application of "Michigan" construction machinery.

JARED S. SMITH has been named manager of Standard Mobile Design Engineering for G-E Communication Products department with responsibility for design activities on new G-E two-way radios.

Other G-E mobile radio appointments newly announced are Richard T. Buesing, manager of electronic design; A. G. Manke, circuit design engineer; G. M. Dewire, standard systems engineer; J. P. Coon, mechanical standard engineer; F. D. Hannell, product engineer; K. K. Bay, transmitter design engineer, and A. E. Englund, power devices design engineer.

ELMER F. TWYMAN, who has served as a vice president since 1950, has been elected senior vice president of The Yale & Towne Manufacturing Company, as announced by Gilbert W. Chapman, president. Twyman directs the materials handling operations of Yale & Towne.

CLARENCE T. GILCHRIST, area manager of sales, western area, a 51-year veteran with American Steel and Wire Division of United States Steel, has retired. Succeeding him will be B. M. Ashbaucher, for the past year manager of Chicago district sales for the Division.

L. L. WILLIAMS has been appointed assistant division manager, Dixie Division of Armco Drainage & Metal Products, Inc. I. G. Tuttle succeeds Williams as division sales manager.

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- DIRECT READING**
- LEVEL ROD**
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599 CHESTNUT STREET
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6 qt. Mark-A-Zone, \$93.50—Bead Spreader, \$34.50

Ask Your Local Supplier or Write Direct

S. B. BEUGLER CO.
3667 Tracy Street, Los Angeles 39, Calif.

... for more details circle 291 on enclosed return postal card

FRANK R. REBEK has been promoted to Detroit division manager for The General Tire & Rubber Company, it has been announced by L. L. Higbee, trade sales manager.

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New
General
Oglethorpe

HOTEL GOLF CLUB • COTTAGES



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owner - manager

Modified American Plan—
lavish breakfast & full course
dinner add \$3.50 per person.



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Are you still active in the field? Have you moved or changed your position? Unless you send this information directly to us we can't be sure. Sometimes a reader's name is cut from the mailing list because we are not sure that our information as to name, title and address is right. Your name might be cut from the mailing list.

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Even if you think we know all about you, please fill in the information requested below and send to us by return mail. Our auditors require proof of accuracy of our mailing list. You are the only person who can help us on this. Do it now before you forget, so you can be sure your magazine will always be properly addressed to you. New names cannot be added or old names retained on our list unless we have all this information. Please print or type.

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At left is the Barber-Greene Continuous Plant; at right is the BatchOmatic. Together these plants produced all asphalt tonnage on the test road. Both proved their ability to meet abnormally rigid specifications.

Barber-Greene's meet tight AASHO test road specs

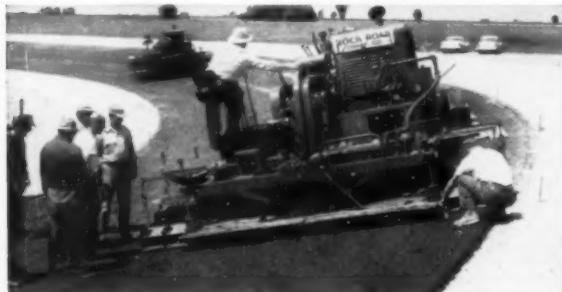
Two Barber-Greene Asphalt Plants, a continuous type and a BatchOmatic, produced every ton of asphalt mix on the AASHO test road near Ottawa, Ill. Every ton was laid with Barber-Greene Finishers.

Specifications on this important test road were more rigid than any normally encountered in highway work. Probably no asphalt mixing and paving equipment has ever before been called upon to meet such close tolerances.

Hundreds of combinations of asphalt mixes and base

and surface thicknesses were required. Each operation had to fall within the time limits specified by a rigid time schedule.

"We knew that Barber-Greene Asphalt Plants and Finishers had the ability to meet these rigid specifications," commented the asphalt contractor, Rock Road Construction Company of Chicago. With over 20 years' experience in the operation of Barber-Greene Asphalt Paving Equipment, the results again justify their confidence in Barber-Greene.



Paving steep super-elevations while staying within close specification tolerances was just one of the stringent requirements successfully met by Barber-Greene Finishers on the test road.



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